Volume 17, No. 11 November 1998

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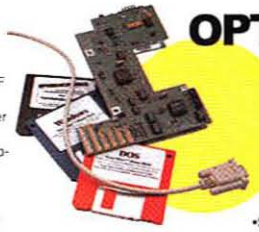

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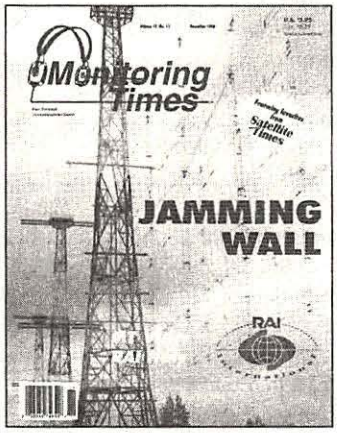

Cover Story

Inside Italy's RAI

By Jim Frimmel

On a recent trip to Italy, *MT*'s programming manager had the opportunity to meet the friendly staff at Radio Roma, RAI International. Come along on a rare, quick tour behind the gates at RAI. The station broadcasts in 24 languages from its transmitter site at Prato Smeraldo. Story on page 8.

Our cover picture is of a vertical curtain antenna northeast of Moscow, similar to many of the antenna arrays used to jam broadcasts from the West. (Photo by Bernd Trutenau)

CONTENTS

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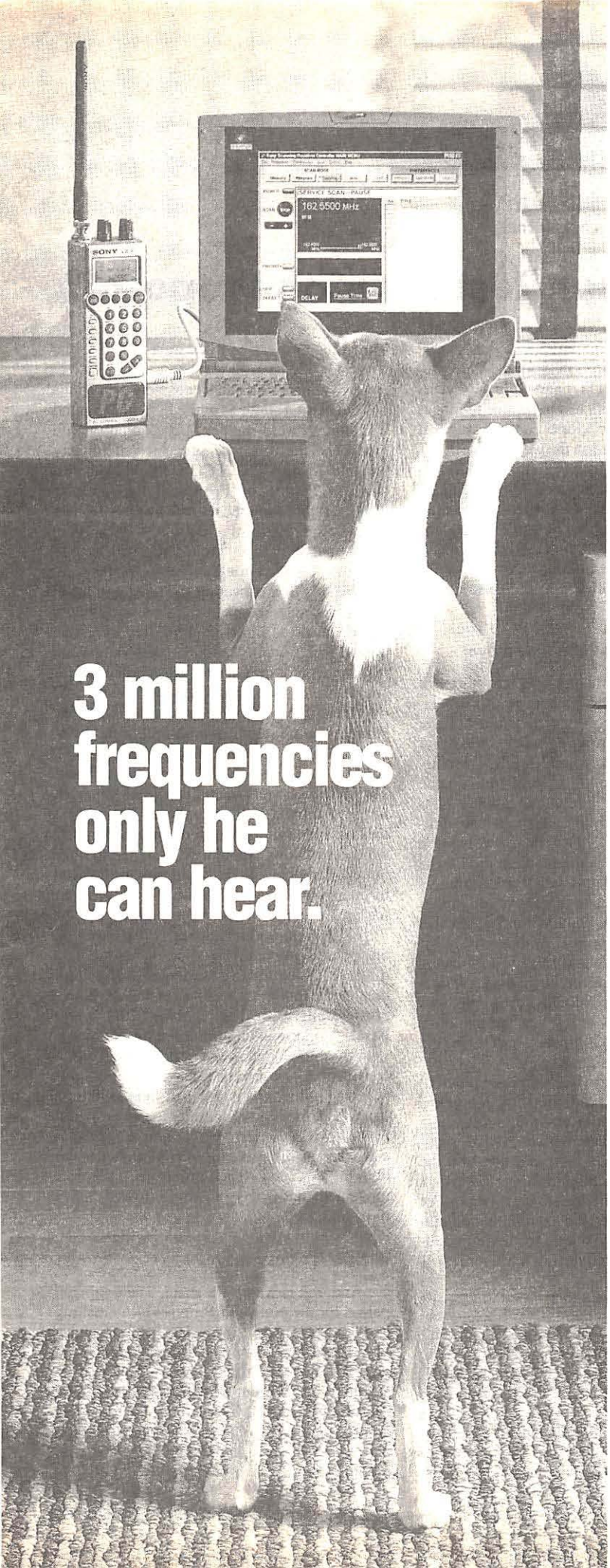

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WASHINGTON WHISPERS

By Fred Maia, W5YI
fmaia@cwixmail.com

What's Behind the Amateur Restructuring Proposal?

It has been nearly ten years since the Amateur Service has been remodeled. In 1989, the Federal Communications Comission (FCC) completely rewrote the Amateur Radio Service Rules. A lot has happened in communications technology since then. Most everyone agrees that it is time bring ham radio up to date.

The current campaign began on two fronts. First of all, satellite and automatic digital technology has developed to the point where analog communications and manual telegraphy are being replaced by more reliable modes. For seventy years, 500 kHz Morse code was the cornerstone of long distance distress communications. Now the Coast Guard does not even monitor the frequency any more. In February, the new Global Maritime Distress and Safety System (GMDSS) becomes mandatory and Morse code on the high seas goes the way of the horse and buggy.

Amateur radio operators still use Morse code, however, and many of their activities are centered around the mode. While no one objects to the use of CW on the ham bands, many question why Morse proficiency should be a licensing requirement. No other mode requires a practical demonstration of proficiency. The answer is that Morse proficiency is still required under international law.

The Amateur Service, like all radio services, is governed by a United Nations agency which determines the ground rules for access to the radio spectrum. The nearly 200 countries that make up Geneva-based International Telecommunications Union (ITU) agreed twenty years ago that ham operators had to be able to manually send and receive Morse code messages if they wanted to operate on the world-wide bands below 30 MHz. The international law does not specify a particular code speed. Most countries, however, believe that 5 words-per-minute is all that is needed under the law. Changing the international rules takes time. A lot of time. It will be another three or four years before the matter can be considered at a World Radio Conference.

The ARRL makes the first move

The United States has an incentive system of amateur radio licensing. That means ham operators get additional frequency, transmitter power ...and even call sign privileges in exchange for more knowledge and operating skill. Currently the FCC requires three different Morse code speed examinations: Five words-per-minute is required for the Novice and Technician Plus license, 13 wpm for the General and Advanced Class ...and 20 wpm is the requirement for the top-of-the-line Amateur Extra Class ticket.

Since 1990, however, there has been a loophole in the FCC rules which permits applicants to by-pass the higher speed CW examinations if they present a doctor's certification confirming that they are unable to copy more than 5 words-per-minute due to a disability. And hundreds ...possibly thousands of applicants have done exactly that! It doesn't appear very hard to get the needed doctor's signature.

The Amateur Radio Relay League (ARRL) is an association of predominantly long term ham operators ...most of whom have passed a high speed Morse examination. ARRL members don't like the waiver procedure and the League petitioned the FCC to adopt rules which would make it more difficult to obtain them. For one thing, they wanted the examining community to be authorized to obtain and review medical records of those requesting a waiver.

Checkmate by the FCC

But there is reason to believe the FCC doesn't go along. We heard about a high level meeting held this past spring between FCC and ARRL officials where the League was told that the Commission was considering a single 5 wpm code speed which would eliminate the need for any waivers. The meeting also coincided with an agency-wide review of outdated regulations. The Amateur Service rules were added to the list.

By summer, amateurs became very curious and concerned about what the FCC had in mind and rumors were rampant that 5 wpm would indeed be the top code speed tested for any amateur license. The FCC staff completed a straight Notice of Proposed Rulemaking (NPRM) and submitted it to the Commissioners for their approval and release.

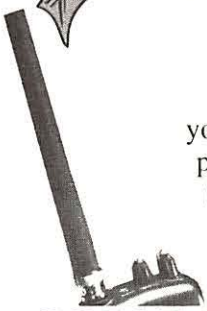
About that time, the ARRL had second thoughts. They saw the handwriting on the wall. At their July Board meeting, the League voted to seek reduced telegraphy proficiency and fewer license classes. For one thing, the directors agreed that 5 wpm should be the code speed requirement for the General Class instead of 13. And Advanced and Extra Class applicants would only have to pass 12 wpm instead of 13 and 20. A letter was written by the ARRL's attorney to the FCC before the NPRM could be released. And the staff got their NPRM document back! The Commissioners wanted the NPRM changed into a combination proposal and inquiry. Instead of specifying lower code speeds, the FCC wanted to know "Should we continue to have three different levels, or should these be reduced to one or two ...and if so, what should be the required speed?"

The Commissioners agreed with the staff on one point, however. They didn't go along with the ARRL's request to make it more difficult for the handicapped to operate on the high frequency ham bands. They said the ARRL's proposals "...place an unfair burden on examinees with disabilities, and raise serious privacy and confidentiality concerns." The FCC's also proposed to reduce the number of license classes from six to four — very similar to that proposed in the ARRL's letter. The Novice and Technician Class licenses would be discontinued under both the FCC and ARRL proposals. There is a movement underway, however, to only have three classes.

Now it's your move.

And that is where we stand. The comment period for the Notice of Proposed Rulemaking ends on December 1, 1998. The FCC is trying a new Electronic Comment Filing System and you can now access the ECFS Home Page on the World Wide Web at **<http://www.fcc.gov/e-file/ecfs.html>** You will also be able to review comments filed by others. We suggest that you participate in the rulemaking. See you next month.

Let Grove simplify your holiday shopping!



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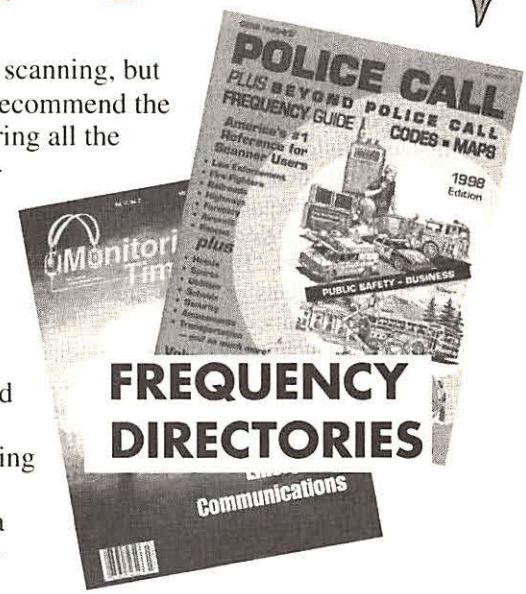

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North Korea's Phantom Satellite

For years North Korea (DPRK) has sold Scud-class missiles to Iran and Pakistan, so western analysts were expecting the launch of a more sophisticated Nodong 3 two-stage medium range version. On August 31st at 3:07 UTC a missile was tracked. What was strange was the flight path — due east, taking it directly over Japan.

The first stage fell in the Sea of Japan between Korea and Japan, and the second stage landed in the Pacific Ocean to the east of Japan. Japan was understandably upset that the missile flew over its territory without any prior notification or permission. Humanitarian aid to North Korea was quickly cut off.

On September 2nd the Korean Central News Agency (KCNA) said, "High-ranking officials and other politicians of Japan are making provocative remarks against the DPRK over a missile launching test that they say was carried out by the DPRK. They describe the test as something 'regrettable' and 'dangerous' and claim that the test made it difficult to improve relations with the DPRK. ... Japan's behavior is ridiculous, indeed, in view of the fact that Japan is zealously developing long-distance vehicles and other up-to-date weapons and paving the way for overseas aggression, having worked out 'guidelines for Japan-U.S.defence cooperation.' ... We warn Japan to face up to reality, act with discretion and renounce its anachronistic hostile policy toward the DPRK at once."

... Not exactly polite things to say to a neighbor, especially the one which can help you the most.

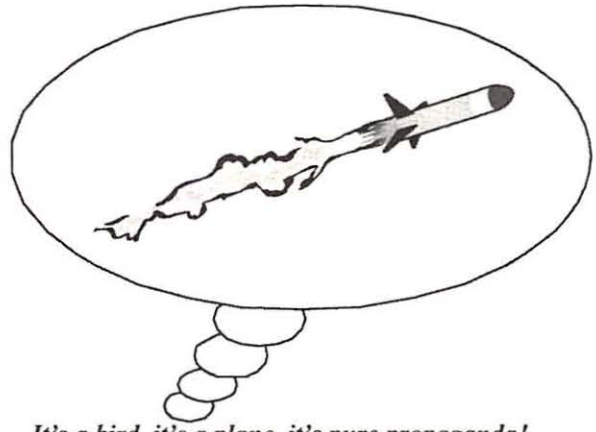
On September 4th KCNA claimed that it wasn't a military missile, it was a launch vehicle for a satellite, saying, "It will contribute to promoting scientific research for peaceful use of outer space." They said Kwangmyongsong No. 1's orbit had a perigee of 218.82 km. and apogee of 6978.2 km. "The satellite is now transmitting the melody of the immortal revolutionary hymns *Song of General Kim Il Sung* and *Song of General Kim Jong Il* and the Morse signals 'Juche Korea' in 27 MHz."

Yes, 27 MHz — Citizens Band!

As a member of the International Telecommunications Union (ITU) the DPRK is required to file an application before a transmitter is put on the air which can interfere with other transmissions, especially spacecraft. The ITU has no filing from the DPRK for any satellite allocations, and 27 MHz is certainly not a band allocated for satellite communications.

Although the Russian news agency ITAR-TASS claimed that Russian military officials had tracked the satellite, it gave the identical figures as in the KCNA announcement, leaving out the same missing parameters. Identical parameters almost guarantee that the numbers trace back to the same source.

More importantly, nobody else has any indication that a satellite existed. It was invisible to all of the radar and visual tracking stations around the world, and no broadcasts were heard by any listeners. The USSPACECOM official press release (delayed due to the Labor Day holiday), stated, "US Space Command has not been able to confirm North Korean assertions that it launched a small satellite on August 31, 1998."



...It's a bird, it's a plane, it's pure propaganda!

Some western officials said they were told that the satellite did reach orbit but it wasn't functioning. This seems highly doubtful considering the capabilities of the USSPACECOM tracking network. It's hard to believe that a satellite — and its much larger third stage — could be missed for several weeks. On the other hand, KCNA claimed on September 14th that the satellite had finished its 100th orbit around the Earth, and even claimed that the satellite was large enough to be visible to the naked eye!

So what was it? Portions of the North Korean statements may be correct; it conceivably could have been an attempted satellite launch. However, there's little doubt that there is no satellite in orbit. If it was a launch attempt then there was a failure during the third stage burn and North Korea's still trying to delude itself into believing that it has a satellite in orbit — functional or not.

The test certainly proved that DPRK can loft a significant payload, whether it's an upper stage with a peaceful satellite or a weapon with a range of 1,646 km.

There's also little doubt that the test has increased tensions in a region already close to armed conflict. South Korea is now talking openly about accelerating its own domestic rocket technology development, and Japan is talking about funding its own spy satellites.

In a country where a significant portion of the population is starving, it has caused the world to wonder about North Korean priorities.

Even if you believe all of North Korea's claims, it did launch a rocket over Japanese territory without prior notification and did not properly apply for a license for its transmitting frequency — hardly indications of a peaceful scientific satellite.

For a "nostalgic" taste of Cold War rhetoric, see the Korean Central News Agency website at **http://www.kcna.co.jp/**

—by Philip Chien, Earth News

BULLETIN BOARD

November 2: DX Test
KLER-1300, Orofino, Idaho, will conduct DX tests between 0200 and 0215 EST, comprised of tones and Morse Code IDs, using 5 kW non-directional. Reception reports may be sent to: Mr. Jeff Jones, Owner, KLER-AM, P.O. Box 32, Orofino, ID 83544-0032. (Arranged by Bill Hale for the NRC CPC.)

Nov 7: Odessa, TX
West Texas ARC hamfest; Contact Robert Jordan N5RKN, 915-335-7980 or *n5rkn@apex2000.net*. For hamfest details see WTARC webpage: http://nonprofit.apex2000.net/hamfest/

Nov 16 -18: Boston, MA
Surveillance Expo '98 will take place at the Hynes Convention Center in conjunction with Northeastern University's Criminal Justice Conference. Seminars, exhibits, panel discussions. Contact Security and Investigations Group, POB 20254, Washington, DC 20041 or Jim Ross at 800-US-DEBUG, *jross@rosseng.com*

November Nightmares in the Clarke Belt

Satellite operators will breathe much easier when mid-November has come and gone — at least, until next year. Around November 17th of 1998 and 1999 the Earth makes its closest pass in a 33 year cycle through debris from the tail of comet Tempel-Tuttle. The meteor shower, known as the Leonids, was last experienced at its height in 1966 at an estimated rate of 150,000 meteors per hour! But in 1966, satellites were scarcely of concern.

However, "we might expect five to 10 functional satellites to be hit by Leonid meteoroids during a storm," say the four co-authors of a report to be found on the Internet at http://leroy.cc.uregina.ca/%7Eastro/Leonids/Leo_2.html.

Although some outages may be experienced while engineers take precautions by repositioning satellites in the end it's a crapshoot. GE American hopes to increase its odds of an impact to one in 100,000 by repositioning, but at 150,000 meteors per hour, that may not be too reassuring.

A License to Jam

This month's feature story on jamming celebrates the cessation of soviet jamming on a major scale, but a new phenomenon has emerged in Japan that could be called "microjamming." Only, the target of this jammer is not foreign broadcasting, but the omnipresent ring of the cellular phone.

Restaurants, concert halls, movie theaters, and hospitals are all venues with very good reasons for banning cellphones altogether. Plastering warning posters on every wall or subjecting the clientele to search and seizure does nothing for good customer relations, however. Thus the attraction of new jammers such as Medic's "Wave Wall."

Wave Wall sends out strong signals on the same frequencies as the cellphones themselves and effectively jams both incoming and outgoing calls. $480 wouldn't have paid the electric bill for a even month of Cold War jamming, but it doesn't seem unreasonable for creating a 20-foot radius of quiet.

Japan is just beginning to address concerns over potential misuse, blocking emergency calls to doctors and others, or interference to other devices such as pacemakers.

Alien Pods at the Pentagon?

"Is this some sort of high powered visible light communications antenna?" wondered Chuck McCullough about the contraption which suddenly appeared on the grounds of the Pentagon.

Stan Sulak pointed us to an article in the July email edition of *DOE This Month*. The bizarre looking structure is an array of mirrors which concentrates the sun's energy onto a receiver/engine to generate electric power. Sulak says, "The unit installed at the Pentagon is designed to provide 25 kilowatts of power — enough to supply electricity to an entire village in a remote area without generating any air pollution."

After spending six months on display outside the Pentagon, the structure will be shipped to its "real job" producing electricity in Arizona.

Bosnian Station Needs Support

Bosnia and Herzegovnia's largest independent radio network is FERN (Free inter-Ethnic Radio Network), funded by the Organization for Security and Cooperation in Europe (OSCE) and the Swiss Government. In two years it has grown from a temporary, two month "elections radio" to a complete 24-hour national news, public information, and entertainment operation.

However, funding commitments cease after the September 1998 elections. It is seeking commercial investments, partnership agreements with other media, advertising, program sponsorship, and voluntary contributions. For more information, see **www.oscebih.org**

"Communications" is compiled by Rachel Baughn from clippings submitted by our readers. Thanks to those who sent in clippings this month: Anonymous, NY; Brandon Artman, PA; David Barger, NY; Philip Chien, FL; Mike Elcsisin, CA; Brian Cathcart, FL; Thomas Folks, PA; Wm. Hearty, OH; Alan Henney, email; Jeffrey Heyman, email; David Howard, PA; Charles Johns, ME; Maryanne Kehoe, GA; Kevin Klein, WI; Ed Lentz, email; Mike Madsen, IL; Alan Masyga, MN; Ira Paul, MI; Glenn Richter, email; Doug Robertson, CA; Michael Saxton, CA; Ari Schwartz, email; Larry and Gayle Van Horn, NC; Brian Webb, email.

Inside Italy's RAI International

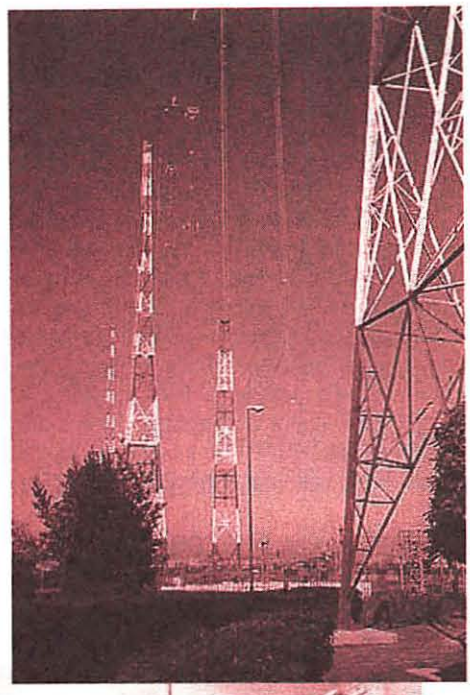


Photo credit: Andrea Borgnino

By Jim Frimmel

On a recent trip to Rome, I had the opportunity to visit the studios of Radio Roma, the name commonly used for RAI (Radio-Televisione Publica Italiana) International.

RAI's corporate offices occupy a vast complex of buildings on the outskirts of Rome in studios known as Saxa Rubra. Thank goodness I had arranged my visit well in advance of arrival, because the location is not open to the public and is well-guarded. Gaining admittance required a phone call from the main guard post (see photo) to my contact and escort, Andrea Borgnino.

While waiting for Andrea to arrive, I registered for a credit-card style identification badge with a magnetic strip. Andrea arrived in good time and, with my badge clipped to my coat pocket, the visit began.

We started with a visit to the office of Fausto Spegni, head of the central radio branch of RAI. I was very pleased to find that both Mr. Spegni and Andrea had an excellent command of the English language, and I did not have to rely on the Italian I had learned while stationed in Italy many years earlier.

A view of the main entrance to Saxa Rubra, RAI's central broadcasting studios.

Andrea Borgnino maintains many of the web pages for RAI and is a frequent contributor to Internet DX information.

Mr. Spegni amusingly pointed out that his name was very appropriate for someone in his position. He explained that, in Italian, the name Spegni is taken from the verb "spegnere," meaning "to turn off," as in "turn off the radio."

After a nice discussion about the situation at RAI, the three of us undertook a tour of the radio and television studios.

RAI's Shortwave Output

RAI transmits on shortwave to the Americas, Europe, Africa, Asia/Oceania, and the Mediterranean. Most broadcasts are in Italian, but there is also programming in English, French, Spanish, Portugese, German, Swedish, Danish, Ukrainian, Romanian, Slovene, Croatian, Turkish, Bulgarian, Czech, Slovak, Polish, Serbian, Hungarian, Russian, Arabic, Amharic, Somali and Esperanto, for a total of 24 languages. No oriental languages are used.

In North America, most shortwave listeners are familiar with Radio Roma's daily 20 minute English broadcast from 0050-0110 UTC. The broadcast actually begins at 2230 hours in Italian, switches to English at 0050, continues on in French at 0110, reverts back to Italian at 0130, and then finishes with Spanish from 0305-0325. The English portion of the broadcast consists of ten minutes of news followed by ten minutes of light music. Summer frequencies in use until October 25th were 6010, 9675 and 11800 kHz.

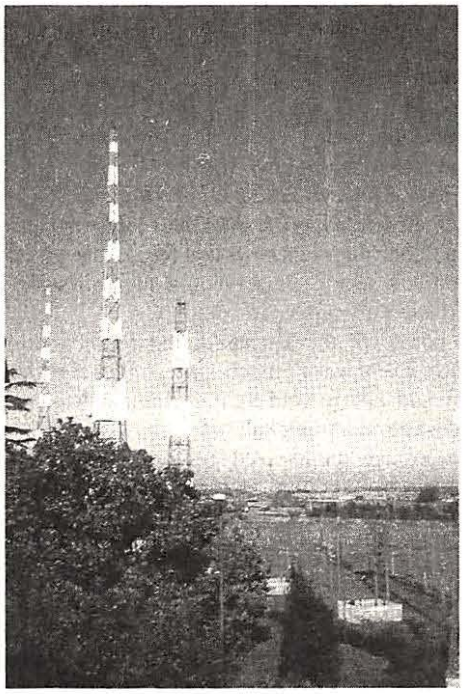
One other English transmission that is often heard in North America is actually intended for the British Isles. The English portion of that broadcast is from 1935-1955 UTC on 5970, 7145 and 9760 kHz (until October 25th), and is best heard in North America on the East Coast.

RAI's Mediumwave Output

Radio Roma's main program in the AM broadcast band is an Italian program called *Notturno Italiano*, which is also broadcast on shortwave and via satellite. It mainly consists of six hours of light music, opera and symphonic music, operettas, and jazz, with news every hour in Italian, English, French and German. It is heard in Europe from 2200-0400 UTC on both mediumwave and longwave.

RAI Satellite Programs

RAI International Satelradio offers 24 hours of the top programs of the three national radio channels as well as RAI International. Programming consists of music, entertainment, news and information. Transmissions are via Hot Bird 1 to Europe, Asiasat 2 to Asia, Orion 2 to North and Central America, Panamsat 3 to the Atlantic coast, Galaxy LA to Latin America, and to Australia via subcarrier of RAI's TV channel. There are also satellite rebroadcasts on AM and FM in Australia, Canada, and the USA.



A view of the Prato Smeraldo transmitter site on the outskirts of Rome. (Photo by Andrea Borgnino)

Many RAI news reports and feature programs are readied for broadcast from these banks of tape recorders.

The Transmitter Site

RAI's shortwave transmitting center is separately located at Prato Smeraldo in the outskirts of Rome. All major transmitters were destroyed during World War II and were later replaced in 1948.

Prato Smeraldo Center presently broadcasts RAI's signals with six transmitters using 30 antenna systems.

Transmitters are all 100 kW Brown Boveri with a Marconi 100 kW used as backup. The Boveri transmitters use Thomson water-cooled output tubes. The AM modulation is digitally controlled.

Twelve of the towers use dipoles and 18 use dopple dipoles with reflectors. There are also numerous vertical dipoles made with long wires stretching from tower masts to the ground.

Looking to the Future

When originally constructed in 1931, the Prato Smeraldo site was considered far enough away from Rome to be interference-free to city commerce. Now, sixty-seven years later, Rome has spread out to the extent that the transmitter site is in need of relocation. Until such a move is made, RAI International is limited to the lower power outputs of the present transmitters.

RAI has a twice-yearly publication called *QUIRAI*, available free of charge from RAI International; Largo Villy De Luca, 5; 00188 Roma, Italy. More information about RAI is also available off the internet at **www.rai international.rai.it**

Jim Frimmel is editor of Selected Programming in MT and owner of DX Computing, radio software for the Macintosh.

Since Alfa Romeo and Fiat have ceased exporting autos to the U.S., it was enjoyable to see all the Italian cars on the streets and autostradas. Sorry - no picture of the new Alfa 156, but here is a shot of the popular new Ford Ka, which parks easily on the streets of Rome.

Making the Best of Apartment Monitoring

By Steve Douglass

I knew it could happen — my landlord had already warned me. Yet, when I opened up the envelope and the letter said that the house we were renting had been sold, it was a shock. I immediately began to contemplate the massive amount of work ahead. The least of which was dismantling my monitoring post.

We had been living in the comfortable ranch-style home for five years. The rent was incredibly cheap for the spacious three-bedroom house so my wife and I felt very lucky to find it. Since my family only numbers three, only two bedrooms were used. The other one became my office ... and, yes, my monitoring post.

In short order the roof of the house became an antenna farm and the "office" was stocked with wall-to-wall radios. To visitors it resembled a miniature version of NORAD, especially at night with all the LED readouts blinking, computers flashing and huge maps of the world adorning the walls. I must say, it was pretty cool.

I snagged a lot of signals from that room. Bombers on missions in the Gulf War, Hurricane Andrew slashing the coast, Jimmy Carter trying his best to negotiate a peaceful settlement with the dictator of Haiti, and even the fall of the Soviet Union, all from my monitoring post in southwest Amarillo.

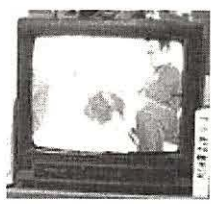
Was it all about to end? What if I couldn't find another such an ideal place to monitor? Good houses were at a premium in Amarillo; could I luck into such a find again?

The answer was revealed to us in short order. Rental rates in Amarillo had skyrocketed and we couldn't begin to afford a comparable place. With the deadline for moving out fast approaching, we had to opt for a decision that I had sworn we would never make. We had to move into an apartment.

Downsizing

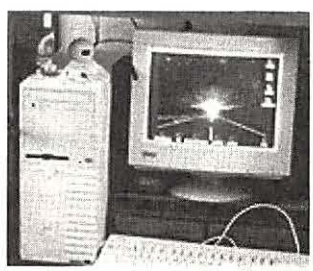
A week before our moving date we finally located an apartment that semi-suited our needs. It would be quite a chore to compress 2700 square feet of furniture and accumulated stuff to fit into 1200 square feet of apartment space. Half way through the move we realized that it just wouldn't work. Most of our stuff, including the bulk of my monitoring post, would have to be put in temporary storage.

As a free-lance press stringer for the local television press it was important that I still have some semblance of a monitoring post. After all, it was my job. I had even developed a reputation of sorts as the local "johnny on the spot" when it came to stories of news interest. If it was happening and was of interest to the public, chances are I knew about it. The local press depended on me to be their safety net and report the important news that their overworked reporters would miss. Would my job suffer because of the move? I assured my clients it wouldn't.



I staked out a small corner of the kitchen/dining room as my monitoring room and office. There wasn't much space, only a eight by ten foot square area that would have to hold eight scanning radios, my computer system, three desks and a filing cabinet.

Also crammed into the postage-stamp-sized spot would have to be no less then three television sets that I used to monitor the three local TV network affiliates. One of my daily services for the local media was to monitor all three six-o'clock newscasts at once, prepare a report on what stories were covered by each, and fax that report to the stations.



The hard part wouldn't be getting all the gear to fit in my *Reader's Digest* condensed version of an office. The problem would be to get it all

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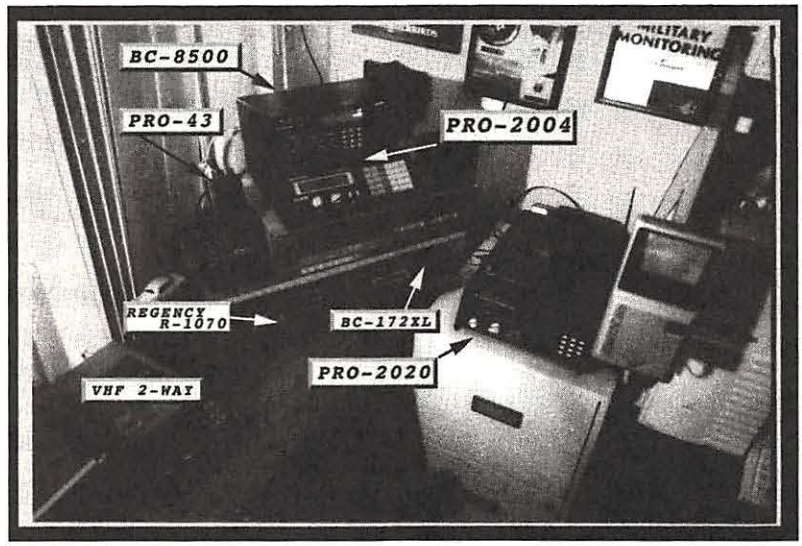
to *work*. Noisy, RF-spewing computers next to sensitive radio gear, and three televisions that produced more interference than a convention of radio pirates all had to be placed within inches of each other. Plus, I had to have some kind of antenna farm. Puny telescopic whips would not do. I had to have an antenna system that not only would be efficient enough to pull in most area-wide signals but would also not alarm the neighbors or my landlord.



With this impossible task in hand, I grabbed a pad of legal paper and began designing my new monitoring post.

After a few weeks of experimenting, hair pulling, dozens of cable ties and ten trips to the local electronics outlet, I finally got the new monitoring post situated. It took a bit of tweaking, but it works. In fact it works very well.

Although I don't quite have the reception capabilities that I had at the old place, on the whole, I can hear just as much. HF reception is a bit degraded but still much better than I anticipated. Area-wide police, fire and emergency communications come in loud and clear and I can hear about eighty percent of what I used to receive on the UHF military bands.

The cool thing is, none of my neighbors are the wiser. Only those who know me are aware that a miniature communications intercept station is operating in the nondescript apartment next door.

So, fellow apartment dwelling monitors, take heart. You, too, can monitor the airwaves almost as well as your home-owning brethren. Read on for some leads you can follow to find your own apartment solutions.

Foiling Interference

The more distance you can put between your antennas and any interfering appliances the better, but if space is at a premium, try shielding both your equipment and the source of the noise. When I encountered interference, I lessened it by carefully lining the inside of my receivers with aluminum foil. Using double-stick adhesive tape to mount the foil, I was able to reduce most computer interference by about eighty percent.

It also helps to line the inside of nonmetallic computer monitors and television cases with foil, but a word to the wise — be VERY careful about doing this. The foil could short out your computer or shock you if you are not very careful in your placement of the foil! Any contact with electronic components could fry it or you.*

As I would discover, not all interference could be eliminated by shielding the equipment. A particularly annoying cyclic buzz could be heard coming over my DX-440. After a few days of turning off all electronic components one at a time in order to isolate the noise, I was able to deduce that it wasn't caused by anything in my apartment but possibly due to some type of heavy machinery used in the complex. Quite possibly it emanated from the laundry room and was bleeding into the radio through the power lines.

A digital signal processing (DSP) filter helped cut down the noise, but didn't eliminate it entirely. The solution came about by accident. After buying a new radio, I ran out of outlets to plug it into. I switched the DX-440's power supply from the wall to my APC 650 Back Ups Pro, a backup battery used for my computer. I had forgotten that this automatic emergency battery supply also had built-in AC line noise filters. Miraculously the line noise all but disappeared!

Other noise reduction steps to improve reception included using high grade coax cable runs to the antennas and replacing the aging, leaky television cable that ran through the apartment with a new and better grade of coax.**

Secret Antennas

There are no less than five antennas connected to my monitoring system and yet all are totally discreet. One is for shortwave reception, three for general VHF/UHF monitoring, and one is cut specifically for the 225-400 MHz military UHF band.

Logistically, the only place to mount the antennas was on the apartment's back balcony. Some tenants grow mini-gardens on their terraces; I chose antennas masquerading as two large fake palm trees. From a distance they can't be seen.

For shortwave coverage I experimented with several antennas until I found one that would give me adequate reception and yet be discreet. I tried running an almost invisible thin strand of wire to a nearby tree, but often it broke and once a bird landed on it, giving its presence away. I'll never forget the lawn man's expression as he caught sight of the sparrow perched, preening his feathers seemingly in midair.

Since a longwire was out of the picture, I

** Editor's Note: We recommend use of an adhesive which will not be affected by heat, and caution that, should the foil come in contact with internal components it could result in damage to your equipment and could be a fire hazard.*

*** The* ARRL Radio Frequency Interference Handbook *(available from Grove) contains more theory, troubleshooting tips and solutions for RFI.*

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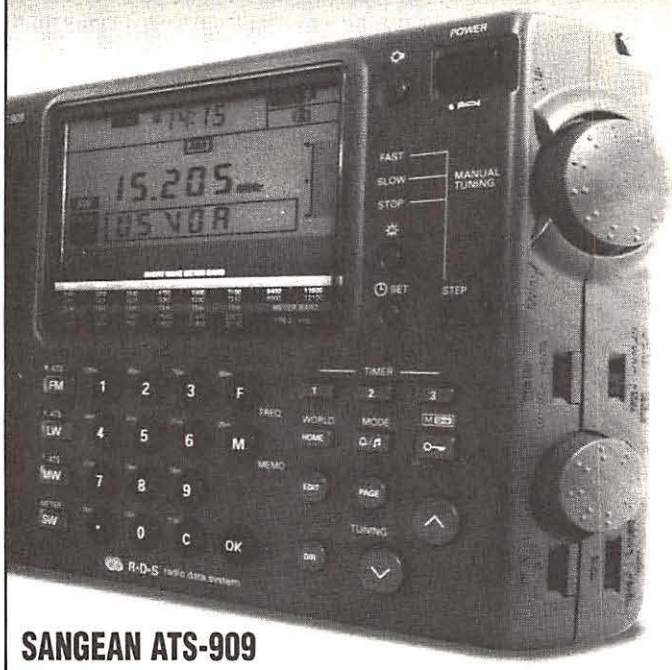

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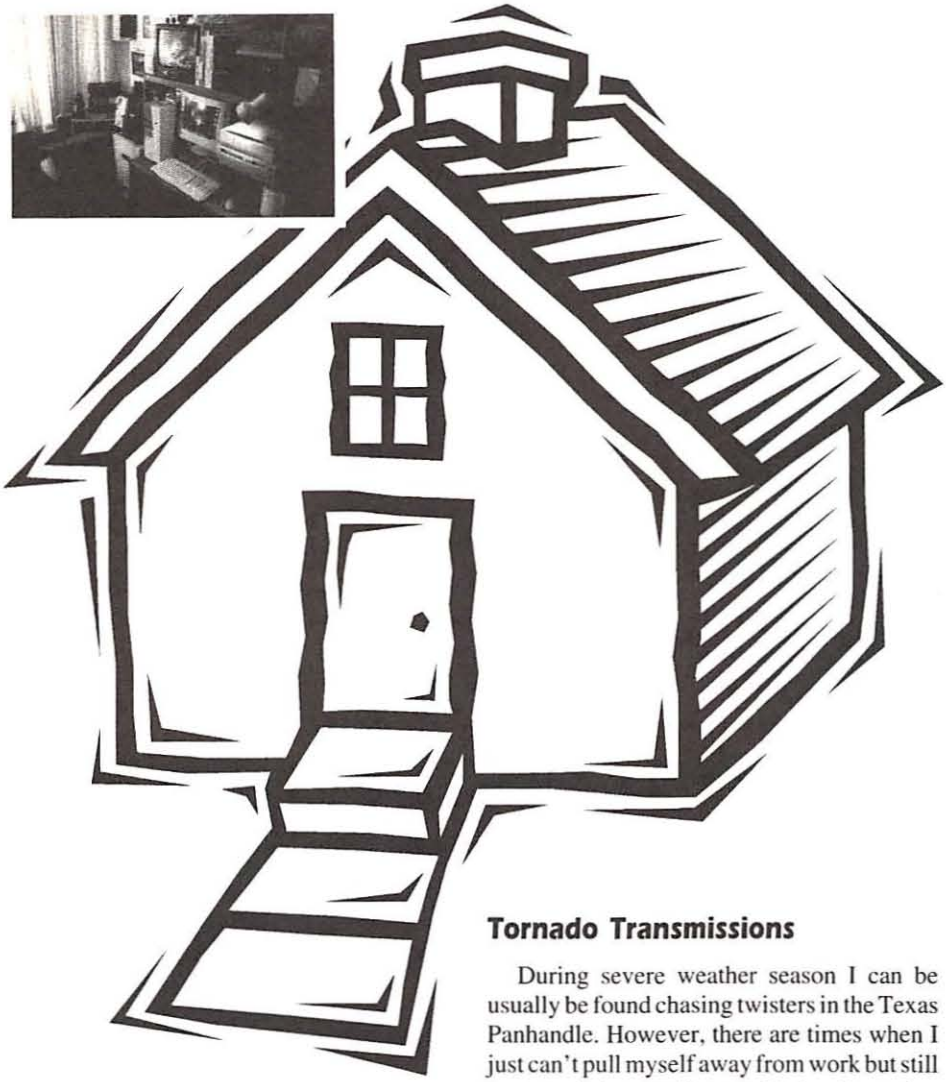

decided to go another route. Mounted horizontally along the wooden rail of my balcony is a Citizens Band 27 MHz steel whip antenna. To make up for the rather short antenna length I ran the coax to a Radio Shack shortwave antenna amplifier. I grounded the antenna to a metal plumbing pipe with a short run of copper wire.

Although the antenna can't compare to a good longwire dipole, reception isn't bad and only really falls off at lower frequencies. I have no problem receiving shortwave powerhouse broadcasters or even relatively weak military sideband communications, which is what I listen to most of the time anyway.

I mounted one of the VHF/UHF discone antennas on a photographer's light stand that I picked up at a garage sale for a few bucks. Another home-brew discone was mounted using nylon cable ties right on the trunk of one of the fake palm trees. The antenna elements blended in with the faux fronds making it nearly impossible to spot.

Tornado Transmissions

During severe weather season I can be usually be found chasing twisters in the Texas Panhandle. However, there are times when I just can't pull myself away from work but still want to help coordinate with local weather spotters and dispatch the press into the area where severe weather is occurring. For this purpose I obtained and licensed two programmable VHF FM transmitters. One is mounted in my chase vehicle and the other is used as a base station for communicating with fellow storm spotters in the field.

When I can't go out into the field what I usually do is monitor the severe weather on television, connect to local weather radars via the Internet, and monitor police fire and emergency channels for reports of severe weather. If the spotters are not in the local area I relay information via cellphone, but if they are close by I use the VHF two-way radio. The latter posed a real problem since I no longer had a roof on which to mount a transmitting antenna.

The solution? I attached a VHF mobile antenna to a metal utility cart that I set out on the balcony. The cart itself was grounded with hose clamps to a metal railing that ran the length of the apartment. I was surprised to see the standing wave ratio (SWR) was very low, the cart and railing providing an excellent ground plane. On twenty five watts, transmission range varies from ten to twenty miles, but reception range is awesome: the radio is able to receive some communications at sixty miles or greater!

The only problems I have encountered with this setup is that I have to turn off all my scanning radios before I key up on the mike; the close proximity of the transmitter wreaked havoc with their sensitive circuits. So far there have been no complaints of television interference (TVI) from my neighbors, most likely due to the fact that I severely limit my transmissions to emergency communications only and resist the urge to chitchat.

Running the Wires

All the coaxial cables for receivers run into the mini-monitoring post through a wall-through-tube that the previous tenants thoughtfully provided so I didn't have to drill any holes and ruin any chances of losing my rent deposit. I didn't want the coax for the VHF transmitter to be in close contact with the receiving gear, so I ran it into the post through a small gap between two glass sliding doors. I check it very often for signs of wear and tear due to the constant opening and closing of the doors.

Electrical cords are kept in check with nylon cable ties with heavy-duty circuit-breaker-protected power strips reducing the risk of short circuits or fire from an overload. All the while I kept in mind that from time to time the landlord would be inspecting the apartment and I didn't want a mass of tangled cables scaring her to death.

Temporarily Permanent

Our "temporary" move into the apartment has now turned into almost four years as we take our time to look for the perfect home to spend the rest of our lives in. Apartment living does have its "perks." No lawns to mow, no weeds to pull, and a lovely pool to take a dip in are things I'll actually miss, so until we find our "home sweet home," my mini-command center in the corner of the kitchen will do quite nicely.

. . . . . .

Steve Douglass lives in Amarillo, Texas, and has written about stealth aircraft and the scanning hobby in a number of books and magazines, including his own online newsletter, "Intercepts."

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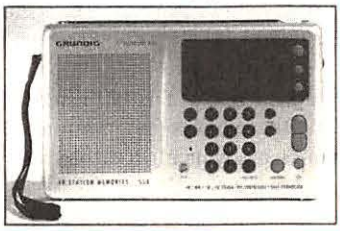

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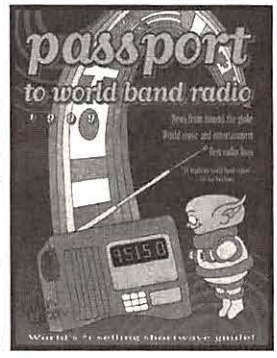

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Jamming Wall

Radiocenter No. 13 located west of Balashikha (east of Moscow): seven of nine masts with three vertical curtain arrays and many dipoles; 15 x 20 kW HF transmitters. (Photo by Bernd Trutenau)

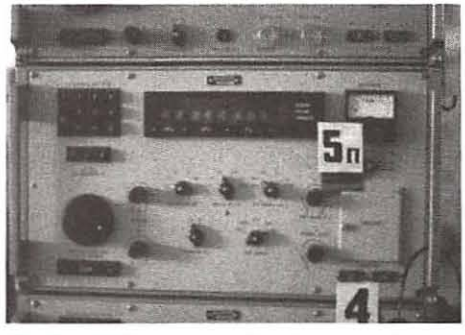
By Rimantas Pleikys

On the evening of November 29, 1988, at 2100 UTC, the Soviet Union ceased to jam all foreign radio stations. The jamming session that lasted for 40 years was over. This article is written in dedication of the 10th anniversary of its end.

The Cold War between Russia and the United States was more than a conflict of powerful armies and nuclear missiles in silos. It was also a battle of words played out on a global scale via shortwave radio. International broadcasters such as the Voice of America and Radio Moscow, using powerful transmitters and multiple frequencies, broadcast their respective messages to millions across the planet. The former USSR didn't want the message of democracy to get through to its people and put up an electronic barrier using powerful transmitters that jammed signals from the West.

Fourteen of the 16 Radio Free Europe/Radio Liberty language services were jammed, and 12 of the 21 languages on Voice of America (VOA). Deutsche Welle was jammed in five of its 11 East European and USSR languages. The BBC was jammed in two of its 12 Eastern languages. The effectiveness of jamming ranged from a minor annoyance to total blockage.

On December 16, 1988, Czechoslovakia stopped the jamming (which had been going on for 37 years) of Radio Free Europe's broadcasts to that country, and on December 23rd Bulgaria followed suit. By the end of year 1989, about 3,000 jamming transmitters were switched off, from Prague to Kamchatka, in some 200 to 220 jamming sites.



Soviet made communications receiver "R-399," 1-32 MHz synthesizer steps 1/10 Hz, used in shortwave communications, surveillance, and jamming systems. (Photo by Rimantas Pleikys)

Shortwave jammers (high frequency or HF) were of two types: short range, also known as "groundwave," low power facilities intended for covering big cities, and long range jammers (ionospheric, or skywave jammers, with directional antennas). The Soviet jamming system was administrated by the RU-2 department of the All Union Ministry of Communications, headed by Mrs. Natalia Krestyaninova for more than 25 years. N. Krestyaninova is now a pensioner in Moscow.

It should come as no surprise that in Lithuania alone, a small Baltic country then occupied by the USSR, as many as five jamming radio stations were in operation in all major cities. Each of them had 10 to 15 transmitters, 1 or 5 kW each. Their effective range was 20 to 30 kilometers.

At many other widespread locations in the USSR powerful jammers were used for blocking out large territories by shooting into specific regions from great distances. The operational one-hop distances of skywave jammers were from 1,000 to 3,000 km; transmitter power ranged from 20 to 1,000 kW.

Dwarf jammers were numbered with "60" and "600" series —"Object No. 603," etc. — while giants were assigned "800" series. Lo-

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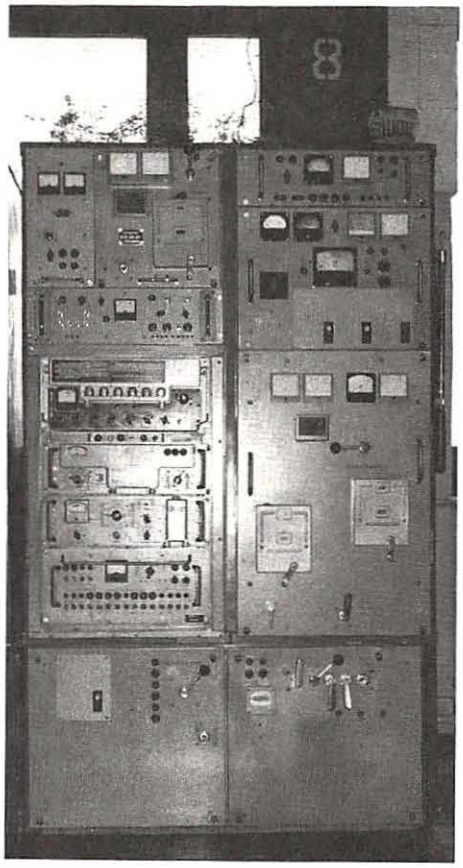


Typical groundwave jamming equipment: communications transmitter "Viaz-M2-OP," 5 kW; 3-30 MHz at Panevezys (Lithuania) site. (Photo by Rimantas Pleikys)

cal jamming transmitters ranged in power from 1 to 20 kW, typically 5 kW, with an average of 15 transmitters per station. If the need occurred, several jammers, most often positioned in different locations, were engaged to block a frequency of an enemy radio station. The antennas for long range jammers usually were vertical curtain arrays of 2/4 or 4/4 configurations. Local jamming facilities had wideband, multi-wire dipoles, suspended vertically or at 45 degree angles.

According to some International Telecommunications Union (ITU) direction finding triangulations, clusters of jamming sources were generally found in the more populous western regions of the USSR near Moscow, Leningrad (St. Petersburg) and Kiev; in the southern republic of Kazakhstan; and in the eastern part of the Russian Federation near Novosibirsk and Khabarovsk. Some experts estimate that the USSR alone might have been spending at least USD 800 million annually for jamming foreign radio stations.

The roar of jammers smothered Radio Liberty, Radio Free Europe, Kol Yisrael, Deutsche Welle, Radio Free Afghanistan, Voice of America, Radio Beijing, Radio Tirana, BBC and some other stations before mid-seventies. Several times, when the political climate became warmer, the USSR would stop jamming government stations from London, Washington and Cologne. But the jamming returned with a powerful howl after the Czechoslovak and Polish crises of 1968 and 1980. In addition, the USSR jammed Polish, Czech/Slovak, Bulgarian, Hungarian and Romanian programs of the Radio Free Europe, as well as Radio Free Afghanistan.

A Look Behind the Jamming Wall

The Soviets were far more advanced than many other countries in the number of shortwave radio centers (44 in all), HF broadcast transmitters (about 300), antennas (over 1,000), and in transmitter power (up to 1,000/2,000 kW), plus nearly 3,000 jamming units.

Jamming Control and Correction Posts (CCPs) used to be installed at some distance from the transmitting sites: from 3 to 10 km in the case of local jamming stations and up to several thousands of kilometers in the case of ionospheric wave systems. The CCP operators, mostly women, monitored the HF broadcast bands in order to identify the stations to be jammed. They also checked the "quality" of jamming and issued orders to the technicians at the transmitting facilities, among whom were a lot of elderly people and heavy drinkers.

The jamming manager/senior engineer received a salary of 165 rubles per month. Mr. Vytautas Liatukas, the supervisor of Kaunas city local jammer in Central Lithuania, complained in an institutional paper "Kauno radistas" back in 1975 about their station "being in continuous shortage of filaments for radio tubes GU-50, transmitter measuring devices, cabling, as well as about the poor condition of the roof of the jammer building and antennas." Some of the KV-5 type transmitters were said to be in operation for as much as 20 years with no major overhaul and were in danger of falling apart at any time.

A semi-professional tape deck "Tembr-2M," used in Vilnius (Lithuania) and other jamming CCPs for playback of speech-type jamming signals. (Photo by Rimantas Pleikys)

Since the transmitter feeders were unshielded, V. Liatukas, who had to work in an environment of 150 MV for more than 30 years, eventually developed cataracts and was later reassigned to the safer CCP.

In order to save tubes, sometimes transmitters were put at less power. Detailed jamming records — frequencies, times, station names, languages and audibility — were entered in shift journals. The jammed radio stations were called "communications correspondents."

Some skywave jamming transmitters were located at normal broadcasting or fixed communications radio centers. In some cases when HF broadcast transmitters were off duty, they were assigned jamming duty.

"The classic jamming pattern still found (1965) in the case of RFE Czech/Slovak and Bulgarian services, and used against all RFE languages prior to November 1956, is that of extensive coverage of a country with low or medium intensity interference from long range jammers located in the Soviet Union or in other satellites, plus reinforcement in highly populated areas by large number of local jammers" (from RFE/RL archive document dated October 17, 1965). For example, several HF radio stations near Leningrad, Kiev, Moscow, Sverdlovsk (Yekaterinburg), Kuibyshev (Samara),Tashkent and Almaty were involved to guarantee the effective shortwave jamming of RFE Polish language service.

Czechoslovakia and Bulgaria most likely paid the Soviets for its export jamming. It would be interesting to know how much they had to pay. Or whether there was a barter arrangement: Czech shoes and Bulgarian fruits for Soviet radio defense?

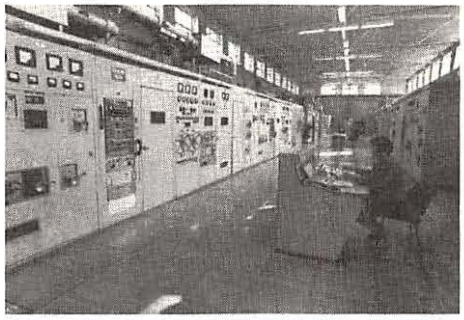
According to an old Soviet standard, masts of the jammers were painted in yellow and black until 1975, to prevent enemy aircraft from identifying them in the natural background. From about 1975 onward, all the radio and TV towers, including jammers, were painted in white and red. They have been illuminated at night with red non-blinking lights.

Jamming Techniques

Every short range jammer used the same

identification code, or call sign, for all its transmitters, usually made up of two letters. The more powerful skywave jamming transmitters may perhaps have had their own ID signals. The call letters of the jammer were sent from each transmitter currently in operation two times per minute, and twice each time. The Morse signal was produced by a simple device: a disk, driven by an electric motor which connected particular contacts into a short circuit every 30 seconds. The jammer personnel called it by the Russian word "mashinka." (See Table 1 and the Oct '86 *MT* article, "FCC Releases Rusian Jammer Locations")

The IDs were assigned in order to enable the CCP monitors to identify each individual jamming station, even distant ones. The final decision concerning the jamming target was adopted by the relevant field CCP; it depended on the actual audibility of the station to be jammed. CCP operators issued orders by dedicated phone lines to the transmitter personnel to tune a particular transmitter to a particular frequency. The jammers engineers never had a chance to listen to what they jammed. After the unit was tuned in, its radio frequency stage was switched on and off remotely from the Control and Correction Post.



"Sneg-M" HF transmitters (19 x 200kW), mostly used in pairs to provide 400 kW, very common for skywave jamming at radiocenters No. 11-1/2 near Popouka, southeast of St. Petersburg. (Photographer unknown)

There were at least ten types of radio broadcast jamming methods:

1. To block out the "most anti-Soviet" stations, a wide spectrum, electronically-generated white noise signal was used. RFE/RL, Kol Yisrael, and Radio Tirana would experience this type of jamming.

2. On August 3, 1964, one more source of interference was invented: Radio Mayak (Radio Beacon) used its distorted program to jam some "grey propaganda" stations such as VOA, BBC, Deutsche Welle, and Radio Beijing.

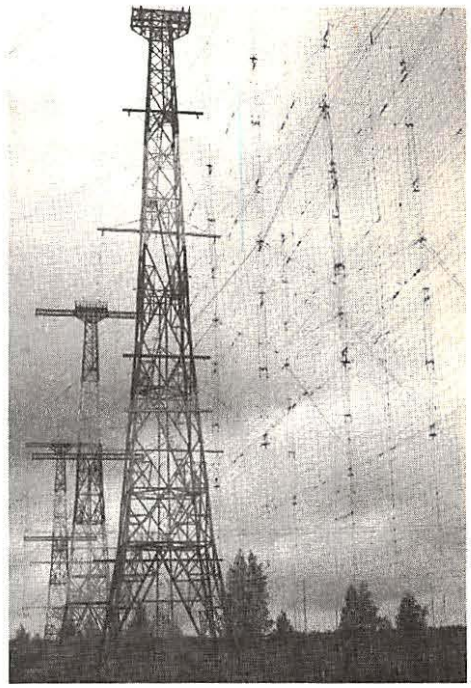
3. Around 1978, Soviets started to use the speech type, or speech resembling signal. Its advantage was that it conformed to the timbre of the human voice. This jamming sound, which used to be played back from open reel tapes, was composed of two voices of male and female Russian announcers of the All Union Radio.

4. There were several occasions reported when jamming made use of a non-modulated carrier wave. This technique was ineffective.

5. Another difficult to identify jamming method is when a jammer started broadcasting a regular domestic or foreign service program on the frequencies of the target station.

6. A unique case was the Polish service of the Radio Free Europe: from 1971 until 1980 only tapes with recordings of light instrumental music were employed to jam it, both nondistorted and overmodulated.

7. Just before the end of the jamming era one more insidious trick was invented. By means of a directional HF antenna, the program of the jammed station was received. The audio was fed by cable to the circuit which changed its phase by 180 degrees, and sent it back to the jamming transmitter, blocking the target station.



4/4 configuration vertical curtain type reversible HF antennas at the radiocenter No. 11-1, near Lesnoy, northeast of Moscow: At least some of skyway jammers of the USSR used this same type of antenna. (Photo by Bernd Trutenau)

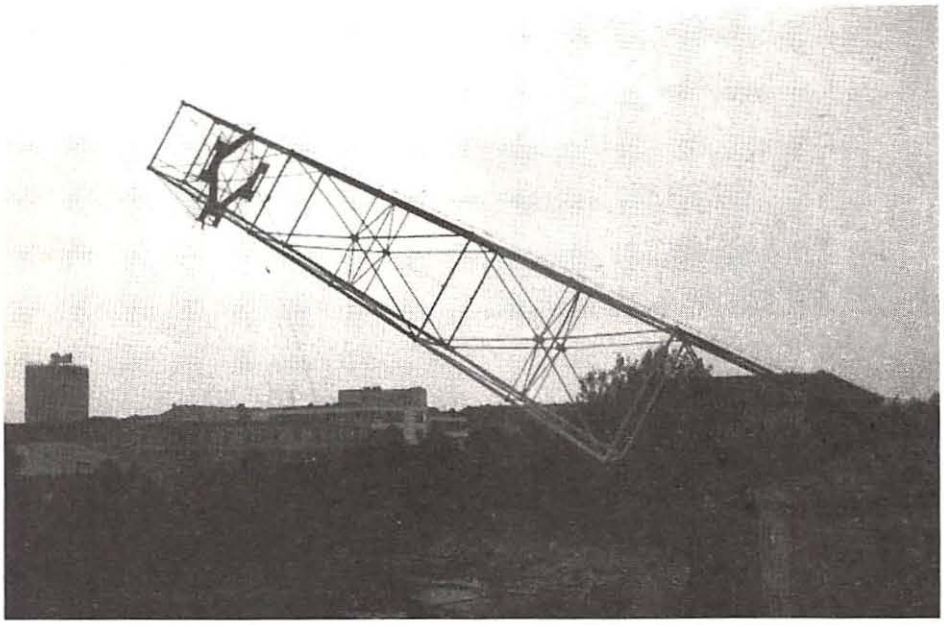
8. During the 1960s the Soviet Union used an especially wild jamming type: medium wave transmitters, usually by night, were tuned on 465 kHz intermediate frequency. Such emissions paralyzed nearly all of the neighboring radio receivers, blocking out everything!

9. The "Democratic Republic" of Germany aired its domestic radio programs via MW transmitters tuned to approximately 800

TABLE ONE: MORSE CODE JAMMERS AS IDENTIFIED BY THE FCC IN 1986

Originally published in the October 1986 issue of *Monitoring Times* by Bob Grove

ID	Location	Country
1G	58-47N 029-31E	USSR
4F	38-28N 066-09E	USSR
AW	64-42N 175-30E	USSR
B1	50-30N 015-30E	Czechoslovakia
BD	52-39N 032-48E	USSR
DR	54-21N 021-00E	USSR
DU	54-30N 034-29E	USSR
GI	56-18N 032-04E	USSR
GM	49-54N 131-56E	USSR
GR	48-45N 135-16E	USSR
IG	49-13N 135-29E	USSR
KB	48-32N 134-20E	USSR
MP	49-00N 023-00E	USSR
MU	41-50N 064-46E	USSR
NS	47-27N 030-30E	USSR
R6	43-17N 027-07E	Bulgaria
S5	49-05N 016-36E	Czechoslovakia
TK	40-56N 067-41E	USSR
TU	55-18N 037-17E	USSR
UA	48-39N 135-47E	USSR
U7	49-09N 018-41E	Czechoslovakia
UD	47-04N 134-30E	USSR
US	49-32N 027-54E	USSR
WI	55-43N 034-40E	USSR
Z1	44-03N 024-39e	Romania
	27-59N 117-24E	China
	55-43N 034-40E	USSR



April 28, 1988: Demolition of the 88.5 meter tower of the Vilnius (Lithuania) local jammer ("Object No. 600") (Photo by Sigitas Zilionis)

Hz outside of the frequencies of the West Berlin based RIAS (Radio In the American Sector).

10. The Soviet Union never used the "wobble jammers" — the swinging carrier jammers, which we still hear from Cuba and from some Middle East countries. Some sources refer them to as being of French origin (?).

The signals emitted by powerful jamming transmitters, which were usually based in downtown areas, were even picked up by the circuits of domestic tape and cassette machines and record players and TV sets. Instead of a music or news one had to listen to a mixture of ugly "odd noises."

Penetrating the Wall

Those who used to monitor the dial and were patient enough, could often find "holes" in the jamming wall. Twilight immunity was one of several technical methods used for many years by the Western broadcasters to reduce jamming. Twilight immunity in essence makes use of broadcasting to the target area on a certain frequency on which the skywave jammer, placed a few thousand kilometers to the East, could not be effective for a given area because of its lower maximum usable frequency (MUF) at that time.

Some of the broadcasters liked to be deceptive: Radio Beijing used to change its frequencies slightly during the broadcast (frequency agility method), leaving the hoarse choir of Soviet jammers aside. There were several occasions recorded when Radio Beijing played its Russian programs backwards, and these particular frequencies were not jammed! There are two versions of this trick. According to the first, a special secret agreement was made by Moscow and Beijing authorities where the USSR did not interfere with the Russian service of Radio Beijing on the frequencie(s) that were audible backwards. Moscow monitors would make tape recordings, play them backwards to make transcripts, and submit the scripts to the KGB and Communist party bosses.

According to the second theory, the Chinese were just playing with Russians: they expected regular "dear Soviet radio listeners" to tape the programs and later to play them in reverse mode. Personally, I favor the first explanation as the more likely.

In the mid-eighties the United States Information Agency (USIA) made the decision to locate its new HF sites for RFE/RL and VOA relay stations in Israel and Sri Lanka (Ceylon). These projects were not implemented due to some environmental, financial and political problems. However, the Soviets started preparing for the construction of high power shortwave countermeasure jammers in Syria and probably Vietnam as soon as they were aware of the USIA's plans.

Even the "Evil Empire" could not create a 100 per cent effective jamming technology, especially in the 15, 17, and 21 MHz broadcast bands. One might wonder why the Soviet industry even continued to produce portable solid state radio receivers with 4, 5, 7, 9, and 11 MHz bands? Simply because they had no other way to deliver party propaganda to the vast territories of Siberia, Central Asia, and the Far East, which were not adequately covered by AM, FM radio and VHF/UHF television networks.

The response of Western broadcasters to the massive increase in Soviet jamming was to saturate their air waves with more frequencies. Kol Yisrael commenced an experiment in Russian language broadcast by adding twelve new frequencies to their regular five, and Radio Liberty by utilizing as many as 19 frequencies (there were plans to reach 40 frequencies in parallel) to complicate the jammers' task.

Officially, the Soviets omitted any mention of the fact that they jammed foreign radio stations for a long time. Later they did admit it but declared they had right to "defend the national sovereignty of country in the fields of information and culture."

When the Soviet Union collapsed, some jammers were converted into broadcasting stations or were put in moth balls; others were dismantled. One such low power jammer, installed shortly after the WWII in the Jewish cemetery of the Lithuanian Baltic seaport Klaipeda, was also dismantled, and the chapel was returned to believers. In another city the closed jammer building was converted into a café. Some former Soviet local jammers were remodified into a commercial radio station, as Radio 7 in Moscow.

In the fall of 1997 Mr. Anatoly Batiushkin, Deputy Chairman of the State Committee for Communications and Information of the Russian Federation (one of the former managers of the jamming system), gave this answer to my inquiry:

"All employees who have had at one time a direct relationship with (jamming) work are now retired pensioners, and my efforts to ask them to review your book (*Jamming*) were not successful. All jamming sites have been either converted to other purposes or have had their equipment written off. All related legal, technical and operational documentation no longer exists."

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This article is based on Jamming, the 164-page book written by Rimantas Pleikys in English. Rimantas Pleikys, former Minister of Communications and Informatics of the Rep. of Lithuania, is now a member of Parliament. For more information on the book check : ***http://www.is.lt/ratekona/2/knygos/jamming.htm.*** *It is available for US$14.95 (plus US$2.00 for airmail delivery) from Mr. Sigitas Zilionis, P. d. 985, LT-2300 Vilnius, Lithuania. E-mail: dx@is.lt*

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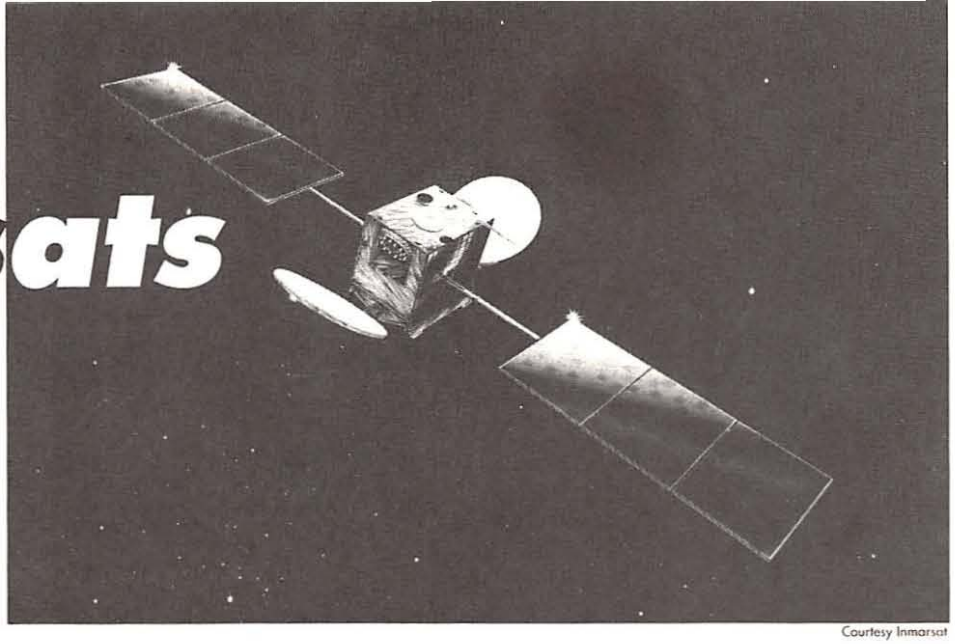


Courtesy Inmarsat

By Dave Cawley

Inmarsat is a system of communication satellites that allows people to talk and exchange data easily from almost every place in the world. Comprising four geostationary satellites, the system was started in 1979, nearly 20 years ago. Using simple equipment and a top end scanner, monitors can hear telephone traffic and witness important decisions being made all over the world, right now, in real time.

Inmarsat, short for International Maritime Satellite, was created so that ships at sea could communicate reliably. HF radio (high frequency or shortwave) is sometimes difficult to use and is often unreliable. The military had realized this and already had their own satellite systems in operation. But what about the long haul ships, the cruise liners, and other vessels out of normal communication range?

Courtesy Inmarsat

Once a maritime communications system, Inmarsat is increasingly used by news reporters, relief agencies, businessmen, and other world travelers.

It was Arthur C. Clarke who, in October 1945, published his paper "Extra-Terrestrial Relays," suggesting that just three geostationary satellites could cover the world's surface. In fact, his title for the article was originally "The Future of World Communications" and, as we all know, he was right — as shown by these opening remarks:

> "Although it is possible, by a suitable choice of frequencies and routes, to provide telephony circuits between any two points or regions of the earth for a large part of the time, long-distance communication is greatly hampered by the peculiarities of the ionosphere, and there are even occasions when it may be impossible. A true broadcast service, giving constant field strength at all times over the whole globe would be invaluable, not to say indispensable, in a world society."

These words must have rung true in the consortium of 47 countries who agreed in 1979 to build a truly worldwide communication system. Not limited by political or physical boundaries and free for all to use, providing safety and continuity where others had failed, Inmarsat became the only service to use.

Arthur C. Clarke had suggested three satellites would cover the world, but to have overlapping coverage four were eventually used. Inmarsat A has the "constant field strength" that Clarke suggested, which means that for as long as the satellite is visible its strength is constant. There are few satellites that provide such big "footprints," other than perhaps weather satellites.

Who uses Inmarsat ?

Who makes use of the Inmarsat service? Certainly most ocean-going ships, but in recent years more and more individuals are using the service. Take the traveling businessman, for example. There is no worldwide mobile phone service, so he has to rely on the hotel phone, often at $12 to $15 per minute, and frequently in Third World countries possessing little or no telephone service at all.

If he has a small briefcase-sized Inmarsat phone with him, it costs just $3 a minute — an argument so compelling I'm left wondering why I don't have one. In fact, despite owning a world coverage GSM phone, I discovered while in Egypt recently, that, yes, GSM works in Egypt, but no, there is no reciprocal licensing agreement. Making important calls through the antiquated hotel telephone service manned by only Arabic speaking people cost me over $600 in one week!

But there are more important nonmarine and noncommercial uses, such as disaster relief, help in inaccessible and hostile areas, scientific research, and, of course, front line news reporting.

Types of Service

Inmarsat A

Inmarsat A was the first standard to be used on the satellites. It has a constant field strength and is analog; in fact, it behaves just like a good quality telephone line. Users can connect modems and call their office, send and receive FAXes and, of course, have a high quality telephone conversation. Some users continue using the A system for its analog

quality when other services would be cheaper.

There are also a lot of A terminals in use, because it was the first service and because it uses the constant field strength philosophy. Its users have chosen the A service for these specific qualities and are unlikely to swap to another service — good news to the hobbyist, since it is this service that is so easy to hear.

Inmarsat B

Inmarsat B is a digital service that provides low quality voice communication and medium speed data capability. Once popular, it is probably a dying mode now.

Inmarsat C

Inmarsat C is a very popular service capable of sending and receiving digital data from a simple omnidirectional antenna. The original use was for a Telex type system, but the standards are flexible enough to handle data for all sorts of uses.

Inmarsat D

Inmarsat D does not yet officially exist, but it will soon. It is conceived as a pager and low rate return system. For example, a road vehicle carrying a valuable cargo can be polled from the D service, and it can return its GPS position using a low speed digital signal. Not much actual information will be transmitted or received, but for those that need this information, it will be very valuable indeed.

Inmarsat M

Inmarsat M is a higher-powered system using spot beams. In fact, the spot beams cover most of the civilized world, and for most travelers it is quite sufficient. The system uses digital speech and low cost, small, light briefcase-type terminals. So popular is the M system that you will find advertisers in this magazine selling systems.

How to receive Inmarsat

A lot of scanners and nearly all top end receivers now cover the Inmarsat frequencies of 1535.00-1543.50 MHz. There are only two problems. The first is that your receiver will only receive analog voice transmissions and that restricts you to the Inmarsat A service. This is no great problem because it always has several telephone calls at any time to monitor.

The second problem is that you will need a suitable antenna and a very low noise preamplifier. There are at least two manufacturers ready and willing to help you in this area.

A slight additional problem is that the bandwidth of the Inmarsat A transmissions is slightly wider than that provided on most scanners. There are two ways around this: one is to put up with the slight distortion on some signals, and the other is to use an out-board demodulator. In fact, the transmissions use a compander that limits the dynamic range of the voice transmission and expands it at the receiver.

In reality, a standard out-of-the-box receiver is fine for casual monitoring of nearly all signals; only the Italians sound distorted!

What if you are willing to put up with a bit of distortion now and again, but your discone isn't picking up anything at all? This is such a common question, I put the following, rather technical answer on the Internet.

The average scanner has a sensitivity of about 1.0 uV at 1540 MHz (for 12 dB signal-to-noise). Using a 35 dB gain preamplifier with a 0.5 dB noise figure increases this sensitivity to just 0.08 uV, a difference of 22 dB. A 3 foot long, circularly polarized, helical antenna cut for 1540 MHz will give about 15 dB more gain than the best discone. Add antenna cable loss of about 6.0 dB. And you end up with 43 dB more signal, resulting in a receivable signal from Inmarsat of about 20+ dB signal-to-noise. So when you try to receive Inmarsat on your discone, it will be about 28 dB below the noise; hence, you will get absolutely nothing at all.

The Satellites

There are four satellites in the series. In most places in the world you will probably receive two; here in England I am very lucky that I can receive three, the maximum possible.

AOR-W is the West Atlantic Region satellite and covers most of North and South America and also most of Europe. It has much clear speech traffic all day and night. Its location is 54.0 degrees West.

AOR-E is the East Atlantic Region satellite and covers parts of North America, South America, Europe and the Middle East. It has a lot of clear speech traffic in several languages as it covers such a large area of non English speaking people. It is located at 15.5 degrees West.

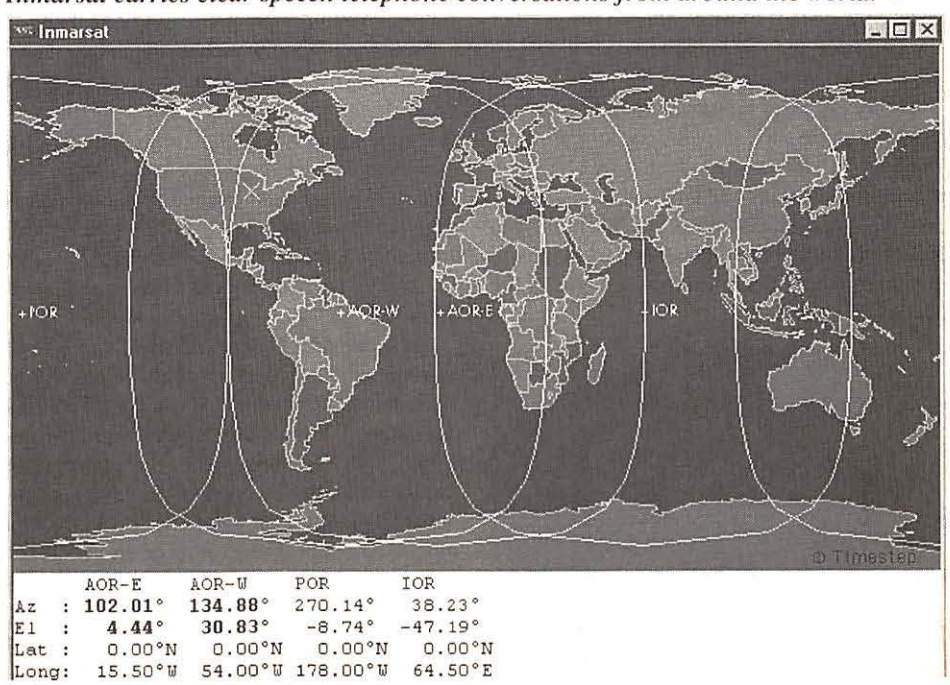
IOR is the India Region satellite and covers the whole of India, Europe and Western Australia. This satellite has a lot of very interesting traffic indeed, most of it in English, as it covers what used to be the main part of the British Empire. It is located at 64.5 degrees East.

POR is the Pacific satellite and covers Japan, Australia and the West Coast of North America. This satellite is out of my range, but I know that several Australian readers are successfully monitoring it. It is located at 178 degrees West.

Setting up a system

You will find that on each satellite there is a 24 hour radio station, AFN (American Forces Network), which can be used to align the antenna. You simply connect the cables and use one of the supplied adapters to fit your scanner. With the scanner set to 1537.0 MHz

Inmarsat carries clear speech telephone conversations from around the world.



and the antenna pointed roughly in the right direction, soon you will hear the broadcast; it is a simple matter to adjust the antenna for maximum clarity.

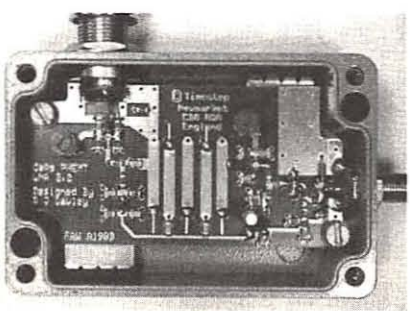
(Editor's note: It has been reported that AFN broadcasts on AOR-W and IOR have been discontinued and replaced with high powered HF broadcasts in the 416/12 MHz marine bands.)

Unlike satellite TV, you have a tolerance of at least 15 degrees within which you can still hear the satellite. From Chicago, for example, AOR-W is 134 degrees, nearly southwest, and 30 degrees elevation. Once you have found the satellite, usually after only a few minutes, then it's time to fix the antenna permanently, although for years I had mine at ground level resting on a plastic box. I have a cheap coax switch that gives me either the discone or the Inmarsat antenna.

I have tried nearly all the receivers that cover the Inmarsat frequencies and they all work well; you do not need a very expensive scanner. As all the signals are the same strength, the receiver's performance is not very critical, and a preamplifier helps make up for any deficiencies. However, in my experience, I would recommend Icom and AOR as reliable performers.

There is a choice of at least two commercial manufacturers from which to purchase the antenna and preamplifier. If you decide to build your own, there are just a couple of things you need to know. The transmissions are in narrowband FM and received with a right hand, circularly polarized antenna. Your receiving system must be able to resolve 0.1 uV or better and the antenna needs about 15 dB of gain.

There are other options, too: in Europe it is possible to modify a TVRO system, remove the 4 or 12 GHz section from the LNB, and feed a two- or three-turn helical feed directly into the IF amplifier of the LNB. Difficult, but not impossible: I have even seen what looked like nearly complete Inmarsat systems at the Dayton Hamfest!



Details of the Timestep preamplifier

The author can receive three Inmarsat satellites with this array at his location in England.

What you will hear

This is the exciting part! The people using Inmarsat systems are not short of money. What they have to say is very interesting. I have heard ships being illegally boarded, ship owners instructing their captains about the time to dock to improve Customs relations, news reporters, deals inside large companies, military communications, and lots more that I simply cannot mention. Though you usually (but not always) get only one side of the conversation, it is generally obvious what is happening.

Those involved in international crime often use Inmarsat: it works anywhere, it is thought to be secure, it is thought to be bug and tap free, and you can pay your bill anywhere in the world. Monitors have allegedly heard drug and arms deals, trade embargoes being broken, several pirate ships working, and politicians colluding and generating cover-ups.

There are dozens of channels in use at any one time; you simply tune up and down and decide what to monitor. Nearly everything is the same signal strength. Computer software could be left to scan and, using the voice detection mode, could store hundreds of messages into your computer via its sound card. Inmarsat is perhaps the only way of using your scanner to listen to new and sometimes distant countries.

At home near Cambridge, England, I have three antennas on the end of my house so that I can listen to three out of the four satellites available. If I hear any interesting news on CNN, I immediately select the appropriate satellite and get the rest of the story hours before it breaks! As I write this article, dozens of calls are in progress on AOR-E. The Joker in the pack? Yes, there is an unknown, ordinary FAX transmission in the clear. Wonder what would happen if you connected your receiver to a FAX decoder?

Inmarsat monitoring is a huge and largely untapped area. You owe it to yourself to put your scanner to some good use above 1500 MHz. After all, didn't you buy it because of its wide frequency coverage? Now is the time to monitor satellites!

Where you can buy

There are two sources of ready built equipment. Timestep, who provide a system comprising: helical antenna, preamplifier, 65 feet of cable, power inserter, adapters for your scanner and a manual. This Timestep system, costing $399, requires only a 12 V power supply.

Swagur Enterprises provide a 3 foot dish, feed horn covering 1500-1800 MHz, preamplifier, power inserter, power supply and manual. This Swagur system, costing $545, requires only cable.

Timestep System (Europe sales)
Timestep PO Box 2001
Newmarket
CB8 8QA
England
Tel. +44 1440 820040
Fax +44 1440 820281
e-mail Sales@time-step.com

Swagur Enterprises
Box 620035
Middleton
WI 53562-0035
Tel/Fax 608 592 7409
e-mail swagur@execp.com
Web site www.swagur.com

Acknowledgements

Arthur C. Clarke, who so graciously invited me to his home in Sri Lanca in July 1992 and who gave me his scientific autobiography and an annotated copy of the "Extra-Terrestrial Relay" article.

Martin Goodrum from British Telecommunications Research Laboratories who worked with me on a DGPS project using Inmarsat, hence giving me the enthusiasm to explore further.

Dave Cawley, G4IUG, is owner of Timestep, which produces weather satellite receiving equipment. He was formerly a senior design engineer for Philips specializing in receiver design, and has been a ham for thirty years.

Richard Barnett
ScanMaster@aol.com

That New Band to Scan

In previous issues we've discussed the pending opening of the 746-806 MHz band for public safety communications. This is the top end of the UHF TV spectrum which is not fully populated by broadcasters nationally. The problem is that there are TV broadcasts within this band segment in most of the major metropolitan regions — the exact areas of the country where the spectrum is needed most.

The call for additional frequencies grew out of the World Trade Center bombing a number of years ago. Many public safety agencies responded to the blast, yet there was little or no interoperability on-scene. These federal, state, regional and local agencies lobbied Congress to open up a new range of channels as there was no existing available spectrum onto which they could migrate. Channels 63-69 occupy one of the least populated portions of the TV band and this is what ultimately was granted to the public safety community.

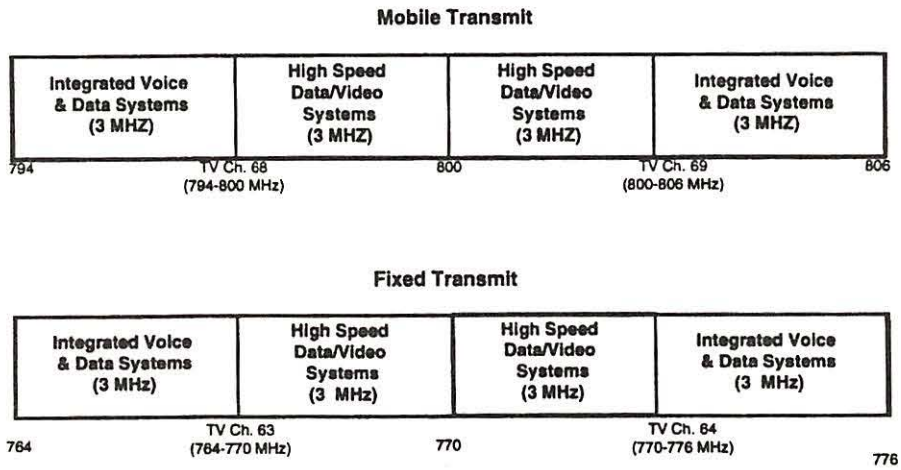
At the APCO (Association of Public Safety Communications Officers) convention which was held this past August in Albuquerque, Ross Ruthenberg of Motorola held a seminar in which he described the status of the allocation procedure at the FCC. It turns out that the Commission has not yet finalized the plans for the band, as law enforcement agencies, in particular, are still debating how best to make use of the spectrum. The FCC, in conjunction with public safety authorities, has been issuing what's known as Further Notices of Proposed Rulemaking (FNPRMs).

While we originally thought that licensing of the 746-806 range was imminent, the list of issues to be resolved is seemingly endless. A partial list of action items includes: how to deal with Canadian and Mexican broadcasters within the band, the desire to actually internationalize the band for global public safety use, the need to formulate national interoperability plans, the development of digital modulation and trunking standards (it is expected that digital trunking will be the norm within the frequency range), etc., etc.

Many conventioneers, including APCO members and manufacturers, had as their objective a desire to adopt a more aggressive mobile/TV sharing criteria than that used at 470-512 MHz. To maximize spectrum availability for public safety without noticeable impact on TV broadcasters, it is important that the FCC takes into account the propagation differences between 470 MHz and 750 MHz; the lower power output of mobiles and portables; the fact that land mobile signals are vertically polarized while television broadcast is horizontally polarized, and like issues. While broadcasters seek to insure that no land-mobile signals will interfere with their television transmissions, public safety does not want to be hamstrung with regulations that make it all but impossible to utilize the new band.

At the time of the convention in August, this much was known:

BAND PLAN



SPECTRUM USE DISTRIBUTION

USE	NARROWBAND (6.25KHZ BASIS CHANNELS)*	WIDEBAND (50KHZ BASIS CHANNELS)**	TOTAL SPECTRUM
GENERAL	7.8 MHZ (1248 CH)	4.8 MHZ (96 CH)	12.6 MHZ (52.5%)
NATIONAL INTEROPERABILITY	0.8 MHZ (128 CH)	1.8 MHZ (36 CH)	2.6 MHZ (10.8%)
SUBJECT TO 3RD FNPRM	3.4 MHZ (544 CH)	5.4 MHZ (108 CH)	8.8 MHZ (36.7%)
TOTAL	12 MHZ (1920 CH)	12 MHZ (240 CH)	24 MHZ (100%)

*Aggregate up to 25kHz. **Aggregate up to 150kHz.

- 24 MHz of spectrum is due to be granted to public safety comprising TV channels 63 and 64 (764-776 MHz) and channels 68 and 69 (794-806 MHz).
- Certain areas of the country have no television broadcasters in this range currently, but the metro areas, most in need of spectrum, do have one or more such transmitting stations. These analog TV stations must be turned off at the end of the DTV (digital television) transition period which is in 2006. Stations in these upper UHF channels which have gone digital can stay where they are until they can subsequently be moved below channel 60 or, better yet, channel 51.
- The balance of the new spectrum in the range will be auctioned to commercial interests in 2001.
- Usage of the new spectrum will include integrated voice and data systems as well as high-speed data and video systems. (Here's hoping that out of all that we can access and decode the digital, non-encrypted, voice transmissions.)

The public safety community has also been pushing for a grant of spectrum in the 138 to 144 MHz band, hoping that federal and military authorities would free up some or all of the band.

This all constitutes quite an "air grab" of late for public safety. Agencies have been moving to digital for spectrum efficiency; the smaller channel spacing (such as 7.5 kHz in VHF) instituted by the FCC will allow for more channels; 764-806 will soon go to public safety ... and now they want even more.

It may be just a reflexive reaction to commercial interests vying to take spectrum away from services such as the amateur radio community. Whoever is first at the door, hat in hand, asking for frequencies — or paying for them as the case may be — may be the winner in the free-for-all. If public safety doesn't grab all it can now, it may not have a chance to go back later.

The Burning of Florida

Another well-attended APCO session dealt with the June and July Florida wildfires that consumed much of the central and northern areas of the state, as well as the interest of the nation. However, there was not a great deal of discussion about the performance of the 800 MHz trunking systems in the region, leaving one to wonder how they in fact responded.

A representative of Flagler County, which was ordered to evacuate (that's right : the entire county's 35,000 residents received an evac order!), reported that all medical communications failed as their tower burned down. Officials tried to put MED 8 up (463.175/168.175) but couldn't get it done. Obviously, whether the cause is towers burning or phone lines melted, maintaining good communications under such conditions is extremely difficult.

Dade County eventually erected portable repeaters for Flagler, but what helped most were actually two-meter ham repeaters that continued in operation throughout most, if not all, of the conflagration. Other representatives reported that their old VHF and UHF equipment came in handy, particularly when they ran out of other portables or those other portables failed. Problems of keeping batteries charged were also described.

On the law enforcement side, county sheriffs on VHF couldn't talk with state agencies on 800 MHz digital systems. This sounds like a matter which needs to be raised at the next state budget hearing.

The most interesting solution involved the Civil Air Patrol (CAP), which orbited fire scenes with repeaters! That's right, airborne repeaters, just like something you might suspect to see under battlefield conditions — which is what this operation was most akin to.

Federal authorities that came to the state to assist with firefighting operations were shocked to find how difficult it was to battle these blazes that were occurring, not on mountainous terrain, but rather on flat, suburban and rural territory. The problem lay in the fact that subdivisions had been built right into the forests, leaving a blanket of limbs, leaves and pine needles covering the tops of homes.

Additionally, the federal radio officials were accustomed to mountaintop sites on which they could position tactical repeaters. In Florida you'll be lucky to even find hills. Federal firefighting crews, which were reported to have 403/408 MHz radios (input/output), could not communicate with the Floridians and had to be led in to many fire scenes by local and county apparatus.

Further comments on radio operations during the Florida wildfires may be forwarded to me at the main *MT* address or e-mail at *scanmaster@aol.com*.

Florida Trunking Systems

Florida is probably the most trunked state in the nation and the central portion of the state probably tops the list as far as system implementation. Trunking is so pervasive in Florida that a TrunkTracker Enthusiasts Group may be formed to help foster monitoring of local trunked systems in the area (go to **www.trunktracker.com** and look under Information on how to subscribe to Trunkcom and find out more about this effort).

Most talkgroups are simulcast between the two main groups. If you use the group 1 list some Orange County Sheriff Office (OCSO) secondary channels will not be heard. If you use the group 2 list you will not hear Orlando Police Department (OPD) emergency channels. Also, any odd number ID is a talkgroup that is being simulcast or crosspatched.

The following information is courtesy of numerous contributors to our web site and of *Police Call '99*.

ORANGE COUNTY/ORLANDO

System 1 (Orlando primary) frequencies:
866.1125, 866.2375, 866.3625, 866.5750, 866.6125, 866.7125, 866.7375, 866.9125, 867.0750, 867.2125, 867.2375, 867.3250, 867.3875, 867.6875, 867.7125, 867.7375, 868.0375, 868.2125, 868.2375, 868.3125, 868.6625, 868.7175, 868.9125

System 2 (Orange County primary) frequencies:

857.4375, 858.4375, 859.4375, 860.4375, 866.0500, 866.1375, 866.3875, 866.4125, 866.6625, 866.6875, 866.8500, 866.8875, 866.9125, 867.1625, 867.5500, 867.8000, 868.1000, 868.1250, 868.2625, 868.2875, 868.5750, 868.6375, 868.8250, 868.8750

Orange County Fire

2096	Fire 1	Dispatch
2128	Fire 2	Comm Center/Unit-Unit/Fire Loss Mgt
2160	Fire 3	District 6 East
2192	Fire 4	Fireground East
2224	Fire 5	District 5 South
2256	Fire 6	Fireground South
2288	Fire 7	District 4 North/West
2320	Fire 8	Fireground North/West
2352	Fire 9	Mutual Aid
2384	Fire 10	Mutual Aid (Osceola County FD Cross-patch)
2416	Fire 11	Admin
2448	Fire 12	Inspections
2480	Fire 13	Supply
2312	Fire 14	Admin/Supervisors Unit/Unit
2544	Fire 15	Unit/Unit
4272	EMS to Orlando Regional Medical Center	
4304	EMS to hospital	
4336	EMS to Sand Lake Hospital	
4368	EMS to Florida Hospital - Orlando	
4400	EMS to Florida Hospital - East	
4432	EMS to Florida Hospital - Apopka	
4464	EMS to Columbia Park Hospital	
4496	EMS to Health Central Hosptial	
4528	EMS to Princeton Hospital	
4560	EMS to Winter Park Memorial Hospital	
4816	EMS to Florida Kissimee Hospital	

Orlando Fire

8080	Tac 1 Dispatch, unit movement, alarm traffic
8112	Tac 2 Fireground
9104	Tac 3 Fireground
9136	Tac 4 Investigations
13328	Tac 7

Orlando International Airport

8016	Airport Patrol (OPD Airport)
8048	Airport Fire Dept.
8720	Airport Facilities Tac 2
8752	Adtranz Trains (between main terminal and airsides)
8784	Airport Facilities Tac 1
8880	Airside Operations
8912	Orlando Executive Airport Operations
8944	Airline Operations
8976	Landside Operations
9008	Airport Parking
9264	Signal 43 Talkgroup
13616	Airport EMS (Backup Tac)
13648	Airport Teletype
13680	Airport Aux (Channel 14)
13840	Airport Emerg (FD Radio Emerg Button Tac)
13872	Airport Car-Car
14320	Airport Shuttle Buses

Orange County Sheriff

2576	Sector 1	Northwest Patrol
2608	Sector 1	Tac 1
2643	Sector 1	Teletype
2672	Sector 1	Car/Car
2704	Sector 1	Special Ops
2736	Possible Sector 1 Service	
2768	Sector 2	East Patrol
2800	Sector 2	Tac 2
2835	Sector 2	Teletype
2864	Sector 2	Car/Car
2896	Sector 2	Special Ops
2928	Possible Sector 2 Service	
2960	Sector 3	West Patrol
2992	Sector 3	Tac 3
3027	Sector 3	Teletype
3056	Sector 3	Car/Car
3088	Sector 3	Special Ops
3120	Possible Sector 3 Service	
3152	Sector 4	South Patrol
3184	Sector 4	Tac 4
3219	Sector 4	Teletype
3248	Sector 4	Car/Car
3280	Sector 4	Special Ops
3312	Possible Sector 4 Service	
3344	Sector 5	I-Drive/Disney Patrol
3376	Sector 5	Tac
3411	Sector 5	Teletype
3440	Sector 5	Car/Car
3472	Sector 5	Special Ops
3536	Admin I (all emergency calls are simulcast on this talkgroup)	

Orlando Police

8208	Teletype	East
8240	Teletype	West
8272	Emergency	West
8304	Patrol	West
8336	Patrol	Central
8368	Patrol	East
8400	Car to car	
8496	Watch Commanders	
8528	11	
8560	Emergency	Central
8592	13	
8624	Teletype	Central
8656	Service	
8688	Emergency	East
9264	Signal 43	

Suburbs

10448	Winter Park PD	Tac 1
10480	Winter Park PD	Tac 2
10512	Winter Park PD	Tac 3
10544	Winter Park PD	Tac 4
10672	Winter Park Fire Dept.	
11824	Maitland PD	Tac 1
11856	Maitland PD	Tac 2
12592	Winter Garden PD	Tac 1
12624	Winter Garden PD	Tac 2
14448	Ocoee PD	Tac 1
14480	Ocoee PD	Tac 2

Other Agencies

336	Disaster A
371	Disaster B
400	Disaster C
944	Animal Services

OSCEOLA COUNTY

Fire

1840	Tac 1	(Dispatch)
1872	Tac 2	East operations
1904	Tac 3	West operations
1939	Tac 4	
1968	Tac 5	Admin
1808	Fire	County Net

Sheriff

272	Patrol	East/Central
784	Patrol	West
528	Teletype	
1040	Support	
1296	Tactical	
1552	Comm Channel	
1744	Civil Division	
1776	Courthouse Security	
2064	Tac 2	
2928	Law Enforcement Net (countywide common)	
2576	County Jail	

Suburbs

3216	Kississimee Police	Patrol
3248	Kississimee Police	Teletype
3280	Kississimee Police	Tac 1
3312	Kississimee Police	Tac 2
3344	Kississimee Police	
3600	Kississimee Fire	Combat (dispatch)
3632	Kississimee Fire	Tac 1
3664	Kississimee Fire	Tac 2
3696	Kississimee Fire	Tac 3
3728	Kississimee Fire	Tac 4
4880	St. Cloud Police	Patrol
4912	St. Cloud Police	Admin
4944	St. Cloud Police	Tac 1
5072	St. Cloud	City Net
5104	St. Cloud Fire	Tac 1 Dispatch
5111	St. Cloud Fire	multiselected dispatch
5136	St. Cloud Fire	Tac 2 EMS response
5168	St. Cloud Fire	Tac 3 Fire response

SEMINOLE COUNTY

Frequencies: 851.3875, 851.4375, 855.4875, 856.2375, 856.4625, 857.2375, 857.4625, 857.9875, 858.2375, 858.4625, 858.9875, 859.2375, 859.4625, 859.9875, 860.2375, 860.4625, 860.9875, 866.1125, 866.3625, 866.6125, 867.3875, 867.6375, 868.0375, 868.3125

Fleet Map (Usr): B0=S0 B1=S4 B2=S4 B3=S4 B4=S4 B5=S5 B6=S12

County/Metro Fire

100-1	Fire	Dispatch
100-2	Unicom	(Talk Around)
100-3	Fire	Tac 1
100-4	Fire	Tac 2
100-5	Fire	Tac 3
100-6	ICS 1	(Incident Command)
100-7	ICS 2	(Incident Command - airport emergencies)
100-8	Winter Park Hospital	
100-9	Technical Services	
100-10	Emergency Services	
100-11	Columbia Park Medical Center - Sanford	
100-12	South Seminole Community Hospital	
100-13	Florida Hospital Altamonte	

County Sheriff

600-1	A Patrol North Zones 1,2,3
600-2	B Teletype
600-3	C Patrol South Zone 4,5
600-4	D Patrol South Zone 6,7
600-5	E Car/Car
600-6	F
600-7	G
600-8	H
600-9	I Longwood Police
600-10	J
600-11	K
600-12	L
600-13	M
600-14	N
600-15	O

Suburbs

000-2	Altamont Springs PD
000-3	Casselberry PD
000-7	Lake Mary PD
300-1	Sanford PD patrol
300-2	Sanford PD patrol
300-3	Sanford PD
300-4	Sanford PD
300-5	Sanford PD
300-6	Sanford PD
300-7	Sanford PD
300-8	Sanford PD
300-9	Sanford PD

Big Savings on Radio Scanners

COMMUNICATIONS ELECTRONICS INC.

Now...Monitor trunked radio broadcasts

Save big on Bearcat 235XLT or BC895XLT trunk tracking radio scanners from CEI. To get your **free fax-on-demand catalog**, dial 734-663-8888 from the telephone handset on your fax machine and follow the recorded voice prompts. Visit CEI on the web at **www.usascan.com** for special savings. Get many free benefits such as extended warranty coverage on new scanners when you use your Communications Electronics Platinum Plus Master Card® issued by MBNA. No annual fee. Call 1-800-523-7666 anytime. Mention offer Q3KI to request yours today.

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SAVE $125 on one **BC895XLT**

Save $125 when you purchase your Bearcat 895XLT scanner directly from Communications Electronics Inc., PO Box 1045, Ann Arbor MI 48106 USA. Telephone orders accepted. Call 1-800-USA-SCAN. Mention offer CEI8. TERMS: Good only in USA & Canada. Only one coupon is redeemable per purchase and only on specified product.

Bearcat®895XLT-A Radio Scanner

Mfg. suggested list price $729.95/**Special $319.95**
300 Channels • 10 banks • Built-in CTCSS • S Meter
Size: 10-1/2" Wide x 7-1/2" Deep x 3-3/8" High
Frequency Coverage: 29.000-54.000 MHz., 108.000-174 MHz., 216.000-512.000 MHz., 806.000-823.995 MHz., 849.0125–868.995 MHz., 894.0125-956.000 MHz.

The Bearcat 895XLT is superb for intercepting trunked communications transmissions (see BC235XLT description) with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include ***Auto Store*** – Automatically stores all active frequencies within the specified bank(s). ***Auto Recording*** – This feature lets you record channel activity from the scanner onto a tape recorder. ***CTCSS Tone Board*** (Continuous Tone Control Squelch System) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle's fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. The BC895XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty.

Bearcat®3000XLT-A Radio Scanner

Mfg. suggested list price $699.95/**Special $329.95**
400 Channels • 20 banks • Twin Turbo Search/Scan
Frequency Transfer • VFO Control • Automatic Store
10 Priority Channels • Selectable Mode • Data Skip
Frequency step resolution 5, 12.5 & 25 KHz.
Size: 2-3/4" Wide x 1-1/2" Deep x 7-3/8" High
Frequency Coverage:
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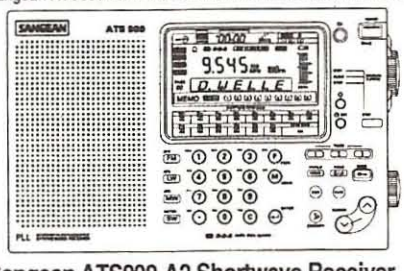

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NCS: Swords into SHARES

In the 1962 Cuban missile crisis, communications failures on both sides made a dangerous situation worse. For the United States, the ultimate result was the National Communications System (NCS), created by a Presidential memorandum in 1963. In 1984, the AT&T breakup inspired another executive order, which expanded NCS into today's alphabet soup of 23 agencies, all hatching plans and coining acronyms at a rate that is dizzying even by government standards.

Therefore, it's no surprise that NCS, with its National Coordinating Center for Telecommunications (NCC), most definitely plays a major role in Federal NS/EP (National Security/Emergency Preparedness) plans. Yes, NS/EP includes post-nuclear postmen and all that, but increasingly the focus has shifted to natural disasters. And this brings us to SHARES.

Shared Resources

We've talked about SHARES in this column before, so this time we'll mostly just hit on the changes. Remember that SHARES stands for Shared Resources. It's kind of like an HF (High Frequency, 3 to 30 MHz) channel pool, but also kind of like the voluntary nets that hams are used to. SHARES can be even more confusing than NCS — and that's saying something! — but it's the relative lack of structure that makes it work.

SHARES, after all, is a net of nets, created by NCS as a backup capability to move urgent traffic between different agencies which otherwise might have quite incompatible radios and procedures. SHARES is growing rapidly, and it's currently up to around 66 members, operating over a thousand stations, representing government, military, industry, and disaster preparedness groups.

While some 250 frequencies have been announced as available for SHARES, note that very few of these are "SHARES frequencies" per se. There's been some confusion about that. Further, only a handful of the participants are dedicated SHARES stations. All frequencies and resources remain allocated to the original entities that made them available. Further, an agency might move a SHARES message on its own system, further confusing listeners.

To be accepted for SHARES, messages must be for a Federal agency, and have NS/EP content that cannot go through normal channels. The flag word "SHARES" is inserted into the message body to identify the traffic. Stations have a lot of flexibility in how they handle such traffic, but they must not compromise primary missions to do so. Most of what you hear is in upper-sideband (USB) voice, unencrypted, though digital modes like AMTOR (Amateur Teleprinting Over Radio) are being encouraged.

Well over half of the stations currently participating in SHARES are from the Military Affiliate Radio System (MARS). MARS operates several ongoing networks of licensed hams, who support the military on non-amateur frequencies. Another large group of participants comes from private industry.

A new player as of late 1997 is NTA, the National Telecommunications Alliance. Here's how it came about: After the AT&T breakup, the regional "Baby Bells" funded Bellcore, a consortium that continued certain centralized activities, including a telephone company point of contact into NCS and SHARES. Bellcore has recently been sold, however, and NTA was set up by the same companies to maintain this essential function.

SHARES Coordination Network

NCS has provided ten frequencies for a Shares Coordination Network (SCN) — not to be confused with a completely different SCN, the Systems Coordination Net operated by the U.S. Coast Guard. The SHARES net, whose frequencies appear in the sidebar, allows coordinators to take availability reports in emergencies and exercises. Stations wishing to be entered into NCC's database as available for SHARES traffic can check in via this net. Later, they can stand down, and be removed from NCC's list. You'll also hear general SHARES and MARS logistics, making the net a good one to monitor in emergencies.

We're starting to hear a lot of activity on SCN. Channels 1 and 2, both long-time NCC control frequencies, are for USB voice. Channels 9 and 10 are for narrowband direct printing, or computer networking via "packet radio." A packet bulletin-board system (BBS) is being created for this use.

Data bursts on 6800 kHz, the new SCN channel 9, have recently confused some "spook" watchers. After all, this frequency used to be a favorite of the CIA for its "numbers" broadcasts. Now, however, it's just plain old SHARES, and you can decode it at home.

The remaining six channels, which are still kind of embryonic, are reserved for future use by Automatic Link Establishing (ALE) radios. ALE is new, and things change rapidly here.

SCN normally operates at what NCC calls level three, in which case routine traffic is accepted. NCC can direct the net to go to level two, which is a potential emergency condition, or level one, an emergency. SCN went to level one in hurricanes Bonnie and Earl.

To ensure readiness, SHARES holds regular exercises, usually every April, August, and December. These can bring out a lot of stations, giving a great chance to update your callsign lists. In August of 1998, SHARES had to postpone a simulated hurricane to work a real one: Bonnie in North Carolina. That's emergency communications for you!

Shares Coordination Network

Ch	kHz	Use	Comments
1	5236.0	Voice Primary 1	Confirmed
2	14396.5	Voice Primary 2	Confirmed
3	4490.0	Future ALE system	
4	5711.0	Future ALE system	was 7632
5	9106.0	Future ALE system	
6	11217.0	Future ALE system	was 17487
7	15094.0	Future ALE system	was 20107
8	17487.0	Future ALE system	was 26812
9	6800.0	Digital Channel 1	BBS/NBDP
10	13242.0	Digital Channel 2	BBS/NBDP

SHARES Coordination Stations (SCS)

Region	Callsign	Agency	Location
SCS East	AAR1DD	Army MARS	West Hartford, CT
SCS Central	AFA3HY	AF Mars	Shawnee, KS
SCS Southeast	WPEH728	AT&T	Conyers, GA
SCS South	AAA6USA	Army MARS	Ft Sam Houston, TX
(Station quit fulltime operations Aug 98)			
SCS Midwest	WNIM867	NTA	Ballwin, MO
SCS Mountain	KCP63	FAA	Longmont, CO
SCS Southwest	NXN0VUV	USN-MC MARS	Costa Mesa, CA
SCS West	KHA908	NASA	Mountain Valley, CA
SCS Northwest	AAA0USA	Army MARS	Tacoma, WA

Utility Loggings

Hugh Stegman

UTILITY WORLD

Abbreviations used in this column

AB	Air Base	NATO	North Atlantic Treaty Organization
AFB	Air Force Base	NDBP	Narrowband Direct Printing
AM	Amplitude Modulation	NORAD	North American Aerospace Defense Command
ARQ	Synchronous transmission and automatic repetition teleprinter system	Pactor	Packet Teleprinting Over Radio
AWACS	Airborne Warning and Control System	R3E	Single sideband, reduced carrier modulation scheme
BBS	Bulletin board system	RAF	Royal Air Force
CAMSLANT	Coast Guard Area Master Station, Atlantic; Chesapeake, VA	RCC	Rescue Coordination Center
CIA	U.S. Central Intelligence Agency	RTTY	Radio Teletype
CW	Morse code telegraphy ("Continuous Wave")	SAM	Special Air Mission, US Air Force VIP flight
DEA	US Drug Enforcement Agency	Selcal	Selective Calling tones
ETA	Estimated Time of Arrival	Swed-ARQ	Swedish diplomatic ARQ teleprinter system
FAA	Federal Aviation Administration	UK	United Kingdom
FAX	Facsimile	UN	United Nations
GHFS	US Air Force Global High Frequency System	Unid	Unidentified
HF	High Frequency (3-30 MHz)	US	United States; USN - US Navy
INA	Iraqi News Agency	VIP	Very Important Person
MC	Marine Corps	VOLMET	"Flying Weather," loosely from French
MFA	Ministry of Foreign Affairs	VVV	Morse telegraphy test group
Minrex	MFA, Cuba		

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time).

2749.0 Saint John's-Canadian Coast Guard, Newfoundland, with Notice to Mariners in English and French, warning of whales in the area, at 0149. (Ron Perron-MD)

2844.0 YHF-Israeli Mossad numbers, completely new frequency, at 1900. (Takashi Yamaguchi-Japan)

3047.0 Halifax-Canadian Forces, Halifax, NS, calling Rescue 108, aircraft searching for crashed Swissair 111, at 0438. (Roland McCormick-GA)

4372.0 "Alpha-Zulu-Echo" - US Navy, with relay from Giant Killer (Fleet Area Control and Surveillance Facility, VA) to "Zulu-Alpha-India," authorizing live-fire exercise. "J-9-J" and "5-O-I" also heard. Took nearly an hour to relay info to all units due to bad reception, starting at 2350. (Ray Stickney-USA)

4660.0 Unid-Chinese female numbers, at 1617. (Yamaguchi-Japan)

4724.0 "5-H-C" -Probably US Navy, warning vessel "2-W-P" of encroachment on his sector, and asking intentions, at 0333. "2-W-P" asking "K-9-F" for permission to leave assigned area, at 0351. (Perron-MD)

4739.0 Halifax Military-Canadian Forces, Nova Scotia, on primary frequency for large search with Halifax RCC, Rescue 115 (search coordinator), and many aircraft, giving alternate frequency as 5717. for two days starting at 0215. (Perron-MD)

4742.0 Architect-Royal Air Force, UK, with "colors" airfield weather at 0131, then working Ascot 3200 (RAF transport) at 0237. (Perron-MD)

4905.0 Unid-CW M1A numbers station, with unexpected end-of-month transmission at 2000 (Ary Boender-Netherlands) *"M1A" is a radio club's designator for a special numbers transmission made at the end of most months - Hugh*

5091.0 ULX-Israeli Mossad numbers, used to be JSR, at 1600. JSR apparently now on at 1530. (Yamaguchi-Japan)

5170.0 CIO-Israeli Mossad numbers, parallel on 10820, at 1645. Chinese female numbers, different day at 2020. (Yamaguchi-Japan)

5180.0 Cape Radio-US Air Force, Cape Canaveral, FL, with Charmer 1 and NASA Booster Recovery Vessel *Liberty Star*, searching for Titan IV debris off Kennedy Space Center, at 1402. (Allan Stern-FL)

5278.0 Unid-CW M1A numbers station, with unexpected end-of-month transmission at 1800 (Boender-Netherlands) *Like 4905 -Hugh*

5574.0 San Francisco-Central/East Pacific air route station, working airliners, at 0440. (David Cole-USA)

5598.0 New York, Gander, and Santa Maria, all in North Atlantic air route net, working Reach 7266 (US Air Force transport) and other aircraft, at 0142. (Perron-MD)

5696.0 U.S. Coast Guard-continuous heavy use for hurricane Bonnie information. (Bob Kozlarek-NJ) Coast Guard 6009-US Coast Guard helicopter, position report for CAMSLANT Chesapeake (VA), at 2330. Coast Guard Rescue 1715, also working CAMSLANT, at 2331. (Eddie Muro-NY) Various Coast Guard comms, possibly related to Swissair 111 crash. (Maryanne Kehoe-GA)

5715.0 Unid-North Korean numbers, followed by martial music, on large AM broadcast transmitter at 1400. Similar, but not parallel, broadcasts heard on 4770 and 5782. (Yamaguchi-Japan)

5717.0 Rescue 24-Canadian Forces aircraft in search for Swissair 111, telling Halifax Military of intention to refuel at Shearbrook, at 0109. Rescue 108-Canadian Forces, telling Halifax RCC that he was also on VHF marine Channel 16, and UHF air 282.8 and 383.2, at 0545. (Muro-NY) Rescue 108, with patch to Halifax RCC, taking control of situation at crash site, establishing safety of flight with three helicopters, and inserting raft with related gear into center of extensive debris field, at 0436. Mentioning search and rescue frequency of 2828 kHz. Reporting rescue 304, a Hercules, on scene and dropping flares, at 0553. (McCormick-GA)

6577.0 American 1165-Air route traffic with New York Radio, at 0216. (Cam Castillo-Panama)

6637.0 Collins Houston-Rockwell Long Distance Operational Control channel, TX, working various aircraft at 0249. (Perron-MD)

6693.0 SAM 683-US Air Force VIP flight, working Andrews after no joy on F311 (11220), at 2145. (Perron-MD)

6694.0 Halifax Military, working many aircraft in fisheries patrol at 1353, and another day at 1556 and 1815. Tip Tank-possible Canadian Forces in NATO exercise, with coded messages, simulcast on 10204. (Perron-MD)

6757.0 Dog Pound-US Air Force, in Nightwatch net, telling Browbeat that he

could not decode his secure transmissions, then asked by Browbeat to change callsigns and see if that worked. Dog Pound said he'd think about it, thought about it, and refused because he had traffic. All this began at 0100. (Jeff Haverlah-TX)

6761.0 Blue 93-US Air Force, using the static callword for tankers going to/from UK, working Blue 75, regarding status of Blue 94, at 0019. (Perron-MD)

6855.0 Unid-Cuban "Atención" numbers, simulcasting on 6826, at 0300. (Bill Fairbanks-FL)

6980.0 Unid-Cuban "Atención" female, AM numbers on Friday at 0205. Same station, Wednesday at 0210, and Thursday at 1125, all in progress, all ending with "Final" around 45 after the hour. (Castillo-Panama)

7668.0 8BY-French Intelligence, Saint Assise, with CW "VVV" and 3-number groups, separated by slant bars. Similar transmissions were heard on 10428, 12075, and 14931. (Yamaguchi-Japan)

8570.0 Unid-Machine generated "female" repeating number "106" over and over, in non-native English, at 0501. (Cole-USA) *Sounds like the Russian Man/Lady, a gender-bending "numbers" voice using several languages and transmitters. -Hugh*

8650.0 SPE-Poland, with CW channel marker at 0248. (Castillo-Panama)

8682.0 EAD-Madrid, Spain, with CW channel marker at 0240. (Castillo-Panama)

8700.0 9AR-Rijeka Radio, Croatia, CW marker at 0236. (Castillo-Panama)

8752.0 *Endeavor*-National Science Foundation research vessel out of Rhode Island, telling unheard station (*possibly NOAA -Hugh*) that ship was now on "the other side of the equator," in a nightly schedule at 0300. (Michael LeBlanc-IL)

8843.0 San Francisco Radio-Central/East Pacific air route control, asked by Delta 16 if the frequency was primary, at 0415. (Cole-USA)

8971.0 Blue Star-US Navy anti-submarine and drug interdiction, Puerto Rico, clear and secure with Top Rock, Argos, and Midnight, several times including 0005. Hunter 02 (British accent), with tracking data for Blue Star at 0343. Bear 3 and Claw 02, making clear ("red") and secure ("green") comm checks with Blue Star, also "7-Y-O" working Tiger 08, all at 2355. (Perron-MD)

8983.0 CAMSLANT Chesapeake-US Coast Guard, telling Rescue 6002 (H-60J from Elizabeth City, NJ) that people have been pulled from the water, so rescue is canceled and the helicopter can return to base, at 1440. (Perron-MD)

8983.0 U.S. Coast Guard-heavy use for hurricane Bonnie information. (Kozlarek-NJ)

8992.0 Contacte Radio-French Air Force "Circus" net, arranging diplomatic clearance for flight over Mexico by aircraft 301 and 303, at 0215. Portuguese Air Force, selcal checks with Alpha Zulu 033, at 0307. This drew interference complaints from the French. (Perron-MD)

8992.0 Match Stick-US Air Force, calling MacDill, no joy, at 1405. (Perron-MD) *Quite a few military operators are still heard calling the closed Global station at MacDill AFB. Oops. -Hugh*

9323.0 Possible US Marine stations Delta, Echo, Foxtrot, Lima, Mike, and Tango, in comm exercise, calling this the "Mullet" frequency, then switching to unknown new channel by "kicking to Flounder," starting at 0200. (Perron-MD)

9725.0 New Star Broadcasting-Taiwan intelligence, with music and numbers messages, in AM at 1500. Similar broadcasts were heard on 8300, 8375, 11430, 13750, and 15388. (Yamaguchi-Japan)

9970.0 JMH3-Tokyo Meteorological, Japan, good copy of fax weather chart, at 1656 (Bob Hall-RSA)

10162.4 INA-Iraqi News Agency, Baghdad, with Arabic traffic to unknown station, in RTTY at 1632. (Hall-RSA)

10204.0 Nightwatch 01-US Air Force E-4B airborne command post, authenticating traffic with Dragnet Uniform, at 1220. Valhalla, also in net, broadcasting coded message and then going to secure mode with Infinite, at 1339. Same day and net as logged on 11214. (Perron-MD)

10527 Unid-Possibly CIA "counting" station, but in USB, not R3E, at 2040. (Yamaguchi-Japan)

10820.0 CIO-Israeli Mossad numbers at 0247. (Dean Burgess-MA) CIO-Mossad numbers, new frequency this hour, at 2145. (Yamaguchi-Japan)

11093.0 Woodpecker-Control in US military exercise, with many tactical comms concerning targets for Bull Knight, Bouncer, Sierra Mike, Romeo, Golf, and Delta, at 0254. (Burgess-MA)

11175.0 AAFA-US Army vessel, passing position and status to Charlie 2 in patch via Ascension, at 0050. Army vessels ADMN (USAV *Corinth*, a landing craft) and ADMG also heard at various times. Turkish Air Force 001 in patch to Incirlik AB, Turkey, via Thule at 0224. (Perron-MD) Teal 33-US Air Force Reserve 53rd Weather Recon "Hurricane Hunter" WC-130, many patches and media interviews with Capt. Scott Spitzer, regarding Hurricane Bonnie, at 0155. (Tony Assenza-CA) Otis 81-US Air Force, enroute to Andrews AFB with "22 souls on board," told Andy that they would not stay the night, "just getting gas and going," at 2333. (Muro-NY) Reach 4018-US Air Force Air Mobility Command, patch via Andersen, informing Ramstein, Germany that aircraft had, "ETA 2300 Zulu with 11 HA" (human remains) and four wounded. Ramstein told aircraft where to offload bodies, at 2023. (Oscar Bosman-Netherlands) *A U.S. medical evacuation flight from the embassy bombings -Hugh*

11214.0 Dragnet Uniform-US Air Force AWACS, probably from Tinker AFB, OK, with patches through Trenton Military, Canada, to Big Deal, Huntress (NORAD regional intercept center at Griffis AFB, NY), and Nightwatch 01, confirming net frequencies as Z190 (10204) and Z175 (9016), starting at 1156. (Perron-MD)

11232.0 Darkstar X-ray-US Air Force, 552nd Air Control Wing, Tinker AFB, with patch through Trenton Military to Raymond 24 (Tinker command post), requesting relay of ops-normal status to Falcon 2 and Sentry 3 (also 552nd ACW), at 0237. (Perron-MD)

11244.0 SAM 27000-US Air Force VIP aircraft, enroute to Germany with US Secretary of State, many patches throughout day, also working Ramstein Command Post on UHF. (Bosman-Netherlands) *State Department mission to pick up embassy casualties -Hugh*

11247.0 Ascot 3201-Royal Air Force transport, UK, getting weather from Architect (RAF command) for Frankfurt, Germany and Brize Norton, England, at 0155. (Perron-MD)

11271.0 ADMN-US Army Vessel *Corinth*, with patch through Thule AB, then went to 13242. (Perron-MD)

11440.0 Teal 23-US Air Force Reserve Hurricane Hunter, with ground radio checks to Accountant (US Air Force rescue), at 1414. Also Spanish-speaking stations passing Zulu times, NATO phonetics, and messages regarding paramilitary personnel. Venezuelan Army, or ...? (Perron-MD)

12212.5 PWH33-Brazil Navrad, with Boletin de Ordones (Daily Orders), RTTY, in Portuguese at 1231. (Hall-RSA)

12380.3 XFM-Manzanillo, Mexico, CW English marker noting that this station will close its Morse services soon, at 0000. (A. Nonomous-NC)

13077.0 KMI-AT&T High Seas, Inverness, CA, with phone call to WY774, the *Aleutian Spring*, only one side heard, at 0232. (Burgess-MA) *This is maritime channel 1301, and the ships transmit on 12230 -Hugh*

13113.0 HLS-Seoul Radio, Korea, short music mirror and phone patches, also using 13161, at 0100. (Yamaguchi-Japan)

13200.0 Thule-US Air Force GHFS, Greenland, patch to Mudbug Control (Louisiana) to schedule air refueling for Doom 83 and Doom 96 (B-52s, Barksdale AFB), at 0219. (Perron-MD)

13267.0 Irkutsk Volmet-Russian flight weather, in Russian, at 0455. (Yamaguchi-Japan)

14000.0 Unid-male and female voices repeating "Nancy Adam Susan, " "Frank Young Peter," and "Queen Thomas Susan," different days at 1400. (Yamaguchi-Japan)

14405.0 Unid-UN High Commission for Refugees, no call or address copied, with administrative messages in Pactor, at 1647. (Hall-RSA)

14686.0 Atlas-US Customs, probably Texas, working Panther (DEA, Bahamas) and aircraft 37 Charlie, who is enroute to base "Echo 3," at 1820. (Perron-MD)

16086.0 Unid-CIA "counting" station, parallel on 21811, numbers in R3E modulation at 1100. (Yamaguchi-Japan)

17147.0 URL-Sevastopol, Russia, with radiograms for ship crews, in RTTY at 1317. (Hall-RSA)

17204.0 LFI-Lyngby Radio, Denmark, with new callsign in CW, no longer OXZ82, at 1326. (Hall-RSA)

17428.9 CLP-Minrex, Havana, Cuba, on frequency usually used by MFA Stockholm, in RTTY at 0954. (Hall-RSA)

18000.0 Unid-voices repeating "Nancy Adam Susan," "Queen Thomas Susan," and "Baker Edward Charlie," different days at 1100. First hits this frequency. (Yamaguchi-Japan) *Yup; same people as 14000, good old Phonetic Alphabet Station -Hugh*

20699.0 SAM-MFA Stockholm, with urgent personal message for ambassador, in Swed-ARQ at 0833. (Hall-RSA)

20998.0 "Quebec-1-2"-calling "Oscar Dos" (O2) and "Eco Cero Cinco Seis" (E056), in Bahia Blanca, Argentina, then went to channel "AC061." (Castillo-Panama)

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Digital Equipment Overview

Continuing with the theme of last month's column, we now focus on the types of decoders currently available to the digital monitor. Once limited to the HF (shortwave) spectrum, decoders are now also available for the newer VHF modes as well.

Back in the late 60's, most digital signal monitors (your editor included) originally started by decoding Baudot RTTY in the shortwave bands. Only the strongest and cleanest signals could be decoded by these early AEA, HAL and Kantronics units — more sophisticated monitoring required more expensive equipment, often in the form of surplus commercial hardware. Many of these early decoders also handled Morse (CW) and ASCII signals as well.

Then in the 70's, Infotech introduced its high end/high priced line of decoders. I remember buying my first used Infotech M-600 from a local policeman at a price of one thousand dollars (twice the amount of the car I owned at the time). The Wavecom unit was introduced in Europe, but was never promoted successfully in North America and even today it remains one of the most expensive units available.

The late 70's and early 80's saw the addition of newer modes on the shortwave bands SITOR-A and SITOR-B, ARQ M-2/4, as well as the increasing popularity of HF FAX. Other standalone decoders were introduced and the Infotech line was taken over by Universal Radio.

The explosive growth of computers in the 90's contributed to the rise of newer communications protocols such as ARQ-E/3, SCI and FEC-ARQ, Packet and Coquelet, as well as a plethora of diplomatic digital modes. Universal and Wavecom continued to introduce outboard decoders that addressed these new modes.

Perhaps the most significant factor in the rise of popularity of digital communications for the hobbyist was the introduction of the personal computer. A relatively simple interface, coupled with intelligent software now provides not only a means of decoding but also of analyzing digital transmissions. As new digital communication protocols are introduced, progressive software engineers can implement new code routines to process them.

The Hoka series of decoders are very popular among many monitors today. Among the most popular is the Hoka Code 3-Gold which retails for just under $600. The small interface cable plugs into one of your COM ports with an audio lead going to the line-out/speaker out jack of your shortwave radio.

Early decoders like this HAL were costly.

In addition to the standard modes found on most decoders today, the Hoka Code3-Gold also includes a plethora of specialty modes not generally available to the digital monitor.

HF modes include:
ANNEX10 (aircraft SELCALs), ARQ-6-70, ARQ-6-90/98, ARQ-E, ARQ-N, ARQ-E3, ARQ-S (SI-ARQ), ARQ-SWE (SWE-ARQ), ASCII, Autospec, Baudot RTTY (IAT-2), Baudot F7BBn (2 channel), Coquelet Mk1 and Mk2, DCF 77 (Atomic Time), DUP-ARQ (ARTAC), Facsimile (FAX), FEC-A (100A/101 and Raw), FEC-S, GMDSS/DSC, Hellscreiber, HC-ARQ, HNG-FEC, Morse (CW), Packet Radio (AX25), PACTOR, Piccolo MK VI, POL-ARQ, ROU-FEC (RUM-FEC), SITOR AUTO ARQ/FEC CCIR 476-4 CCIR 626 Modes A & B, SITOR ARQ CCIR 476-4, CCIR 626 Mode B NAVTEX, SITOR RAW, Spread, SSTV (Martin-1), SYNOP decoder (AAXX/BBXX with 10,000 stations), TDM242 ARQ-M/4-242 CCIR 242, TDM342 ARQ-M2/4 CCIR 342-2, TORG-

VHF modes include:
ACARS/SITA, DTMF, FAX (Meteosat), Packet, and POCSAG/Super POCSAG.

Hoka also makes a professional model , the Hoka Code-30, costing more than $2000.

Codes, Privacy, and the Law

In the past few years, decoders have also been available for the newer VHF digital modes used by pagers (POCSAG and GOLAY) as well as the digital communications system used for air/ground aircraft transmissions (ACARS).

During the past three years, considerable controversy has existed at the federal level in the United States regarding the privacy of communications. These concerns have led to the blockage of cellular phone frequencies for scanners sold in the United States as well as Universal's self-imposed withdrawal of sale of its line of decoders to private American citizens.

Fortunately, as you read this column, the popular Universal M-450 and M-8000 decoders will be available for sale to the general public once more**; however, the updated versions will no longer feature decoding of the VHF Pager modes (POCSAG and GOLAY).

Although it may be very tempting to purchase a decoder that handles every conceivable mode that currently exits, it should be remembered that in reality, you probably will never encounter many of the esoteric modes on the shortwave bands, and even if you do, many of them, such as the newer diplomatic modes, will be in the language of that country. Unless you are fluent in Serbian, Hungarian, Roumanian, etc., their message content will escape you.

By way of illustration, Joerg Klingenfuss in the 1998 *Guide to Utility Radio Stations* has compiled the following statistics from the 11,800 frequencies cited in his tome.

"Out of all non-IATA 50 Baud teleprinter signals of utility stations monitored here, there is:

- 50 % SITOR-A and SITOR-B;
- 13 % IAT2 75 Baud;
- 6 % VFT;
- 5 % ARQ-E;
- 3 % each ARQ-E3, ARQ-M, FEC-A, IATA2 100 Baud, and PACTOR;
- 2 % and less of all other teleprinter systems each."

Best wishes for a happy and safe holiday season.

** Note: Universal Radio is an American company and its line of decoders is manufactured in Florida. Hoka Electronics is a Dutch company and is not bound by U.S. regulations. Similarly, scanners sold in other countries, such as Canada, do not have cellular phone frequencies blocked.

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WBCQ - An Alternative Shortwave Station

WBCQ, Monticello, Maine, began testing August 20 and began programming September 8, only on 7415, on a 245° beam, which roughly crosses Buffalo, Columbus, Evansville, Little Rock, San Antonio, Laredo, Durango, Tuxpan, across the Pacific to south of New Zealand.

During the first week, nothing was more entertaining than Al Weiner's time-filling monologues, with the possible exception of the wacky revival of *Radio Newyork International* with Johnny Lightning on Sunday night.

Committed to freedom of speech, Weiner made time available to the neo-Nazi *American Dissident Voices* and to *Hour of the Time,* but also planned to carry impressionist Harry Shearer's political satire, *Le Show*, Sundays at 7-8 pm ET, as we suggested. Al also said he wanted to carry master storyteller Jean Shepherd. Gary Bourgois' satellite show, *Friday Night Live*, was at 9 pm-midnight ET. The latest program schedule should be posted at **http://theplanet.wbcq.net** which early on gave this info:

"WBCQ - The Planet is a 50,000 watt shortwave radio station that serves North America, the Caribbean and most of South America on 7415 kHz. We can broadcast your organization's programming to the world for the lowest cost of any such broadcaster serving our region of The Planet. Our airtime is available for as little as $50/hour.

"We will accept programming via mailed audio cassette, VHS-Hi-Fi, reel to reel tape, telephone, satellite or internet feeds. We encourage groups with a leftist, alternative, pacifist or populist perspective to take advantage of this unique opportunity to get their message out. Contact Allan H. Weiner, General Manager or Randi Steele, Operations Manager for further details at (207) 985-7547."

In response to a call-in question, Weiner said WBCQ has 14.2 dbi gain, equivalent to 18-20 over 50 kW transmitter power, considerably more than half a megawatt in the main beam of 245 degrees, but he couldn't remember the beam width. Antenna is a hybrid, both log periodic and beam, 60 feet or about a halfwave above ground. Transmitter is a 50 kW Harris MW converted to SW and now designated a SW-50, with pulse duration modulation (PDM), not plate or linear modulation; uses an Inovonics 222-02 audio processor modified for SW; it's simple, clean and broadband, and we must say the audio is quite good both on voice and music (but not on some of the phone lines).

Weiner closed his inaugural broadcast with "We are the light, and thunder, and the truth shall set us free."

Randi Steele was moving from NY to Monticello to be primary operator of the station. And she is in for a *real* winter.

First-night listener Jim Wishner in Duluth opined: WBCQ has potential to put some life into SWLing — some fun, some unpredictability, and some energy.

AFGHANISTAN R. Voice of Shari'ah, Kabul, is on the air 0030-1840 but SW 7200v is only used part of the day; includes news in English at 1645-1700. R. Voice of Shari'ah of Takhar Province, Taloqan, taken over by Taleban forces in mid-August from pro-Rabbani forces, 1230-1325 on 7085 (BBC Monitoring) Check out my sound files of this and many other Asian and African stations: **http://home.winsocket.com/~Vaghjee/** (Mahendra Vaghjee, Mauritius, *hard-core-dx*) Kabul's English later switched to 1700-1715 (Mikhail Timofeyev, Russia)

ANDAMAN ISLANDS AIR Port Blair, 4760, partial data card depicting statue of an elephant holding its mahout in its trunk received in one month for an English report sent registered mail to "General Correspondent." Verie signer A. K. Bhatnagar, Director (Frequency Assignments). Note: this was my second attempt to QSL via registered mail. The first attempt was returned because the correspondent listed in *PWBR* was no longer there. If you have an outstanding request of AIR Port Blair for a QSL, you might want to remail to this gentleman (Rich Hankison, KS, *Cumbre DX*)

ANTARCTICA LRA36, R. Nacional Arcángel San Gabriel, 15476, is still 1 kW; may not get new transmitter until next year; 1230-1430 M/W/F but the technical operator is sometimes away so a broadcast is missed (Gabriel Iván Barrera, Argentina, radio-escutas) Then it was going to be inactive for a month (Barrera, *Cumbre DX*)

AZERBAIJAN R. Baku on much better new 9165 ex-6110 including English 1700-1730 (Kai Ludwig, Germany) One hour later in winter? (gh) Was heard at 0215-0300, 1100-1500, 1600-1800 in various languages (Mikhail Timofeyev, Russia, DSWCI *DX Window*)

BELGIUM [non] RVI's English broadcast to NAm will be relayed via Bonaire from the end of October, at 2230 on frequency TBA; replaces direct broadcast at 1230 on 15545 (RVI *Radio World*)

BHUTAN BBS, Thimpu sked on 5030: Mon-Sat 1000-1245 in Dzonkha, 1245-1315 Nepali, 1315-1400 English; Sunday on 6035 at 0400-0830 in Dzonkha, 0830-0900 Nepali, 0900-1000 English (*Radio-Incontro*) One of the *World of Radio* shows in November will feature a *Wavescan* special about this station, on its 25th anniversary (gh)

CENTRAL AFRICAN REPUBLIC I've been hearing Bangui back on SW on the (slightly) new frequency of 5036.36 kHz until the new signoff time at 2100. Reception isn't very good and I'm sure they are no way near the nominal power of 100 kW. Sounds more like 100 W to me. I believe the station returned in early August after having been silent on SW for some 6 or 7 months (Stig Hartvig Nielsen, Denmark, *hard-core-dx*)

Radio MINURCA is a 24 hr UN mission station on FM in Bangui which planned to add SW in Sept, 20 kW, on different day and night frequencies (David Smith, R. MINURCA, RN *Media Network*) Set up in connection with elections later this year and may be moved to another country, such as Philippines, afterwards. Frequency chosen by a Canadian advisor is 11300, but I suggested something clear in the 9180-9260 range; also may use 7.3-7.5 and 11.4-11.6 MHz (Stig Hartvig Nielsen, Denmark, *hard-core-dx*) It was quickly pointed out by Robert Joosten, Michiel Schaay that 11300 is a very active aeronautical frequency in East Africa, and hoped that R. MINURCA would not actually use it (gh)

CHILE Voz Cristiana heard on 5845 at 0400 (Don Putnick, CA, rec.radio.shortwave) It's the semi-harmonic of 11690 kHz (gh)

CHINA CRI has a new website: **http://english.cri.com.cn** (Jim, rec.radio.shortwave) And from Sept a new arrangement of their opening music with more horns (Joe Hanlon, *Review of International Broadcasting*)

CONGO D.R. R. Candip, Bunia, under rebel control since mid-August, 5066 kHz at 0400-0700, 1330-1800 in French and Swahili, includes News daily at 0500-0530, 1500-1530 purportedly from "RTNC" Kinshasa, but is really pro-rebel. Alternative frequencies: 7150, 3390 kHz (BBC Monitoring)

COSTA RICA RFPI's kitty which has taken over the station has been named Paz, which happens to sound like Paws. Pacifica Network News was finally added to the schedule in Sept, from internet feed, UT Tue-Sat at 0030-0100. James and Debra Latham have a new weekly hour, *Millennium*

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; J-98=May-Sept; Z-98=Summer season; W-98=Winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there.

Dreams, about their lives, RFPI, remotes from Costa Rican locations, storytelling, Mon 2000, Tue 0400, 1100, Fri 2330, Sat 0730, 2000, Sun 0400. It was planned to simplify RFPI's URL to: **http://www.rfpi.org** and change the E-mail address accordingly. Lifetime memberships in Friends of RFPI are $1000, payable at $500 this year and $500 next, or $100 for the next ten months. Info from Oregon office phone, 503-252-3639 (RFPI *Mailbags*)

Continent of Media, our program broadcast only on RFPI, is now also available thanks to Harry Helms at: **http://www.DXing.com/ContinentOfMedia.html** using RealPlayer 5.0 or G.2 player (gh)

CROATIA Zagreb being heard on new 5040 kHz is again explained as a mixing product between the MW transmitter on 1125 kHz and a new SW frequency of 6165 kHz from *2200 UTC (Kai Ludwig, Germany)

CUBA [non] An Anti-Castro Historiography's URL including lots of clandestine radio info has changed to: **http://polisci.home.mindspring.com/ach.html** (Armando F. Mastrapa, *Cumbre DX*)

A broadcaster for R. Martí, Luís Flores, pleaded guilty to lying to the US Government about personal moving costs from Washington to Miami. Flores could face up to five years in prison and a $250K fine (Fort Lauderdale *Sun-Sentinel* via Mike Cooper)

CZECH REPUBLIC Czechs Worried Over Radio Free Iraq: Here are some excerpts from Radio Prague's news in English for Sunday, August 23:

"Radio Free Europe officials have rejected criticism regarding their failure to consult with Czech government officials on the chosen headquarters for Radios Free Iran and Iraq, which are to go on the air late September ... Czech deputy premier Egon Rounsky pointed out that the (billet?) chosen to house this service was located right next to a nursery school and the cabinet had no information as to what kind of security measures were being taken. He stressed that when the safety of Czech citizens was involved the cabinet should have been consulted" (Roger Tidy, UKOGBANI)

DODECANESE ISLANDS The final VOA Rhodes SW transmitter was to close down in mid-August (Dan Ferguson, IBB, *Cumbre DX*)

DOMINICAN REPUBLIC Ondas del Yuna, Bonao, on 2700.09 = 2 x 1350 at 2345 with all-bachata format led by acoustic guitar but with electric bass and occasional accordion, steady all evening with fine audio past 0352, said 24 hours (Jay Novello, NC)

ECUADOR Harmonic, 4019.93, LV de Su Amigo, Esmeraldas, 3 x 1340, 0205 to 0500* Aug 23, tropical uptempo selections and "Billie Jean," mentions of *Programa La Fiesta* and *Su Amigo* by male DJ, S7 signal, entertaining music, and great audio, despite noise. Signed off with full ID mentioning 1340 and 96.3 "FM Digital," and vocal version of Ecuadorian national anthem. There are RealAudio samples of this on my sprawling logs/samples page, **http://itre.ncsu.edu/radio/samples/** (Jay Novello, NC)

R. Baha'i, Otavalo, 4950.34, caught with English ID at 0949, asking for reports and spelling out address (Dave Valko, PA, *Cumbre DX*)

We at HCJB are concerned about the report of distorted audio in your September column, but we are not using an Orban 9105a (Roger Stubbe, HCJB Worldradio, CO)

HCJB reports that due to the recent Cuban air crash in Quito, talks have begun again to implement building of a new airport. That is leading HCJB engineers to renewed efforts to look for new sites to relocate the transmitters from Pifo (Joe Karthaus, *World of Radio*) The present airport is one of the most difficult in the world to approach. You have to fly around some volcano tops just before touching down and the city has grown up with skyscrapers during the past two sesquidecades under the final approach, so aircraft are just a few metres above the top of tall buildings, and sometimes clip them; also the area is subject to fog (Anker Petersen, DSWCI *DX Window*)

EQUATORIAL GUINEA R. Africa, American religious programs in English, 2130-2300 on R. Nacional Malabo frequency 5003.5. What's going on here? (Michael Schnitzer, Germany, *hard-core-dx*) R. Africa was always part of R. Nacional, so it's not surprising it showed on the latter's frequency (gh)

ETHIOPIA V. of the Revolution of Tigray sent a QSL letter saying they have a 10 kW transmitter in Mekelle, the capital city of Tigray region, on 5500 and 7515 kHz: M-F 0400-0500, 0930-1030, 1500-1900; Sat and Sun 0400-0900, 1100-1630. Address is P O Box 450 (Daniel Canonica, Switzerland, DSWCI *DX Window*)

R. Fana, Amharic for "torch" or "light," began on Nov. 7, 1994, operated by the Ethiopian People's Revolutionary Democratic Front. In late 1995 R. Fana said it was no longer owned by EPRDF but is an "autonomous radio station deriving income from educational sponsorship by some NGOs." Addr is P O Box 30702, Addis Ababa. Alternate HF is 9335. Schedule in Amharic/Oromo all on 6940, 6210 and 1080 kHz: daily 0330-0530, 0900-1100, 1500-1800; Sat and Sun also 0530-0730, 1200-1500; M-F also 1800-2000 (BBC Monitoring) 6210 improved as fall approached, heard from *0328 including rather nice flute music (Robert Montgomery, PA, *Cumbre DX*)

GERMANY Süddeutscher Rundfunk (SDR) and Südwestfunk (SWF) merged into the new Südwestrundfunk (SWR) at the end of August. SDR had SW on 6030, SWF on 7265. Both were to carry the SWR-3 pop music program 24h, Klaus Köhler was told by SDR (Kai Ludwig, Germany)

GUAM KSDA had AWR *Wavescan* Sunday 1330 on 13720, three weeks old (gh)

INDONESIA According to my monitoring on August 28 - 29, RRI stations (except those with asterisk) signed off using the "Love Ambon" tune as follows. (Juichi Yamada, Japan, *Jembatan DX*):

3215.0	RRI Manado -1515
3264.6	RRI Gorontalo -1310
3325.0	RRI Palangkaraya -1600
3344.9	RRI Ternate -1515
3355.3	*RRI Jambi -1655**
3976.1	RRI Pontianak -1700
4000.0	RRI Padang -1655
4606.4	RRI Serui -1515
4753.3	RRI Ujung Pandang -1555
4766.0	RRI Medan -1600
4845.2	*RRI Ambon -1130**
5040.0	RRI Pekanbaru -1600
7173.2	*RRI Serui -0910**
9552.6	RRI Ujung Pandang -0850*
9741.6	RRI Sorong -1215*

IRAN [non] Democratic Voice of Iran, 6210 kHz is useless in Sweden, but 5835 kHz has a good signal. This anti-Iranian government station has nationalistic tendencies. 1745 UTC with news and music. They have a site on the Internet **http://www.dvi.org** with information in English and Persian. (Mehrdad Sahba, Sweden, *Cumbre DX*)

IRAQ R. Mother of Battles, the Radio of all Arabs (Arabic: *Idha'at umm al-ma'arik. Idha'atu kul al-arab*) heard on excellent new 9685 at 1600-1900v //11785 under QBS (*Panlview*, Bulgaria)

[non] V. of the Iraqi Communisti Workers' Party, Sulaymaniyah, 1630-1830 daily in Arabic/Kurdish on 4000 (BBC Monitoring)

IRELAND RTE's media program *Soundbyte* is on the Sunday overnight service to USA NPR stations from WRN, and can be accessed in RealAudio, **http://www.rte.ie/radio/soundbyte** (Harry Sarkas and Finbarr O'Driscoll, *Review of International Broadcasting*)

KOREA NORTH R. for Soldiers at the Frontline reactivated in Aug after 10 months off, 2625 kHz with usual war dramas, music, political comments, daily 1400-2000 in Korean; MW 1613v has similar but not parallel programming (Sonny Ashimori, Japan)

KOREA SOUTH Yonhap News Agency, Seoul, press radioteletype in English to Asia: Mon-Sat 0030-0300, 0730-0900 UTC on callsign 6MK64 11602.5 kHz and 6MK50 7868 kHz (BBC Monitoring)

KURDISTAN Two stations, the Voice of Iraqi Kurdistan on 4060 and the Voice of the People of Kurdistan on 4085 stopped their transmissions at 1654 on 13 June. After two minutes they resumed. Both broadcast from one and the same radio centre (Mekhonoshin, Russia, World DX Club *Contact*) Or at least are on the same power grid (gh)

MALDIVES [non] FEBA Seychelles has a broadcast in the Maldivian language Fri 1630-1700 on 11670 ex-11600. It's jammed by the Maldives government, a 100% Islamic country (Victor Goonetilleke, Sri Lanka, RN *Media Network* via World DX Club *Contact*)

MEXICO Officials of Radio Educación told me that the SW transmitter on 6185 is now 10 kW and in the near future they are putting in service a new antenna with a gain 4.4 times the nominal power. And Radio Educación has a new SWL program, *Entre Medios*, one hour on all topics of radio and DXing. Wednesday at 2200 local time (Thursday, 0300 UT) & Friday at 0000 local time (Friday, 0500 UT) (Pedro Sedano, Spain, *Cumbre DX*) After DST the times should be 0400 and 0600 UT (gh)

XERTA, 4800.7, has a new program *En Línea* UT Tue, Thu, Sat at 0200-0300 [as shifted for winter], about Mexican culture, show people, gossip, folk, pop and rock music by a young group of journalists, produced by myself and Alfredo Villavicencio (Julia Serradilla, DSWCI *DX Window*) Also on XERTA is the new *Transcontinental DX* program, Thu 0000-0100 (Hector García Bojorge, México DF, *Cumbre DX*)

Dr. Julián Santiago spoke with the director of Sistema Rasa in Mérida: they plan to broadcast on XEQM 6105 segments from their other stations besides

Candela FM, want to answer all the letters, and may soon have a QSL card. Also want to price a new more powerful transmitter and apply for a power increase (Héctor García Bojorge, México DF)

NEPAL R. Nepal, 5005.03 kHz, heard at *0011-0025 during a late-August geomagnetic disturbance, fair and clear as was //7165.24 but both had only a very weak het the next night (Brian Alexander, PA)

NEW ZEALAND The dollar amount of the cut which has caused RNZI's drastic reductions is less than $100,000 US. If the NZ government isn't willing to pay it, seems to me that it could be raised by grants from elsewhere, even a single private benefactor. That's peanuts in the world of international broadcasting (gh)

PAPUA NEW GUINEA NBC's R. Morobe, 3220, is off the air due to transmitter faults, likely to stay off a while (*National* newspaper, Port Moresby, via Matt Francis, *hard-core-dx*)

PERÚ Radio Satélite, Santa Cruz, 6725.54, has seemingly started early morning operation on shortwave. It was first noticed until 1200 on 15 Aug, fair signal. Electricity was formerly supplied only in the local evening in the Province of Santa Cruz, so Radio Satélite had operated only at 2300-0300. Therefore, I assume that they have now electricity for 24 hours a day. According to announcement, the morning program *Saludos Musicales* is at 1100-1300 (Takyuki Inoue Nozaki, Japan)

R. Virgen del Carmen, Huancavelica, 4886.72 at 1100 with ID, replacing R. Villa Rica (Takayuki Inoue Nozaki, Japan)

R. Nueva Sensación on new 6618.16, strong at 0130 with wobbly Peruvian music, IDs (Jay Novello, NC) The one which used to be on 6895 until a few years ago. Will soon be on from 0930 all day long; sometimes just "Súper Sensación" (Henrik Klemetz, Colombia, DSWCI *DX Window*)

Ondas del Rio Mayo again using alternative frequency 6697 [sic] mornings and evenings (Hans Johnson, *Cumbre DX*) 6797.68 [sic] at 1019, beautiful signal with music filling the room (Jay Novello, NC, *ibid.*)

SIERRA LEONE Sixteen people have been sentenced to death for their part in last year's military coup, including Hilton Fyle, former BBC broadcaster and owner of an FM station here; and Felix George, former head of the SL Broadcasting Corp. (*The Times* via Joel Rubin) Found guilty of treason, because they brodcast material allegedly in support of the junta which seized power last year (and which was itself overthrown earlier this year with the help of mercenaries (Chris Greenway, British DX Club)

SINGAPORE R. Singapore International, external services to Asia daily: 1100-1400 Std. Chinese 6120, 6000 kHz; 1100-1400 English 6150, 6015 kHz; 1100-1200 Indonesian & 1200-1400 Malay 7245, 6070 kHz (BBC Monitoring)

SOMALIA I am the Coordinator for the UNESCO Civic Education for Peace and Good Governance in Somalia project which is based on community mobilization for peace through radio. We are partners with Radio Hargeisa and Radio Galkayo. Radio Hargeisa's signal can barely be heard even within Hargeisa itself. We are looking for technical assistance to assess their needs as well the possible donation/sale of used equipment to restore their radio which was destroyed in the civil war. Help is needed urgently as Somali refugees in Djibouti and Ethiopia do not have information regarding the situation in Somaliland (North West Somalia) and are uncertain as to whether to return.

A radio team from throughout Somalia is producing two weekly programmes for peace and reconciliation: a soap opera *Geedka Nabadda* (Tree of Peace) and a radio magazine, based on material recorded by community groups throughout Somalia, *Muuqaalka Nolosha* (Visions of Life). We are working on establishing networks of community groups trained in some basic radio techniques as a foundation for future community radio stations. We currently have Peace Resource Centres in Hargeisa, Bosasso, Garowe, Belet Weyne and Mogadishu. The programmes plus an *Omnibus* (the two programmes together) is broadcast weekly by Radio Hargeisa, Radio Galkayo and Radio KBC (in Kenya).

We are funded by UNDP but the funds are being reduced due to an overall lack of funding for UNDP and a decline in international support for peace building in Somalia. We are currently seeking support, including sister stations for Radio Galkayo and Radio Somalia. We are working on an English language feature on the project for radio stations. However, we do not have the ability to download it onto the Internet. We could send a copy of the cassette to anyone interested in broadcasting it (Pamela Collett, Project General Coordinator, UNESCO Civic Education for Peace and Good Governance in Somalia; email: mukinduri@form-net.com via Creative-Radio Mailing List via DevMedia List via Don Moore)

SUDAN R. Omdurman, 9200, after the American bombing, was on later than usual 2300* with plenty of IDs, angry-sounding music (Jay Novello, NC) Later heard on 9220 but still announcing 9200, English with anti-American comments at 1800 (Ralph Famularo, Japan, *Cumbre DX*)

SWEDEN Digital Shortwave — In the future there should be a new way to listen to Radio Sweden in the old way — good old shortwave isn't dead yet. Around the world there are several projects working on what is sometimes wrongly called Digital AM, a digital version of the traditional AM mode on long, medium, and shortwave. Here in Sweden, Teracom, who run our transmitters, is one of two international centers carrying out research on how different ways of coding a radio signal and fitting it into a normal 10 kHz wide shortwave channel sound. For two weeks last spring, volunteers spent 6 hours at a time, listening to and evaluating different coding systems (George Wood, *MediaScan*)

SWITZERLAND At the end of October, SRI is closing down the omnidirectionanl European service on 6165 kHz, leaving only the directional transmitter at Sottens in operation in Switzerland; SRI is counting on spillover from other sites, and satellites to fill the gap (Bob Zanotti, SRI, *Review of International Broadcasting*)

UKOGBANI There has been a small overall decline in the estimated audience of the World Service from 143 million in 1996/7 to 138 million in 1997/8. The fall is most marked in developing countries; for example in Egypt where the audience has reduced by 4 million. In Europe audiences are slightly down, largely owing to the closure of the Finnish service. Audiences are increasing in other countries: up by 1.2 million in Russia, up by half a million in Ghana and other parts of Africa. In the US and the Caribbean audiences have risen to record levels. The WS still commands a mass audience in countries where there is little else that people can depend upon. In countries such as Afghanistan, Somalia, and Rwanda the BBC acts almost as a national broadcaster. However the number of such countries is diminishing. The audiences which find the WS of most value tend to be the more highly educated, for whom it is their first choice for authoritative international news. In Turkey, for example, while only 1% of the Turkish population listens to the BBC WS, it reaches 25% of the country's opinion formers. In the coming year the WS will invest more in new servies to make possible the introduction of television news programmes in selected languages, drawing upon existing BBC material. They aim to launch a second WS in English channel and to increase use of FM and digital systems to improve reception (BBC Annual Report via David Bowman, World DX Club *Contact*)

When the solar flux is up, look for BBC WS harmonics above 30 MHz, such as 30970, 31130, 35410 kHz (Wolfgang Büschel, Germany)

USA Mark from Michigan is no more. Mark Koernke, co-host of *The Intelligence Report* on WWCR, is probably no longer on the air. After failing to show up for a trial in late May, Koernke was on the run for a few months, according to stories in the *Ann Arbor News*. The same paper reports that he was caught in late July. Koernke reportedly had urged listeners to kill an assistant U.S. attorney on the show last year (Hans Johnson, *Cumbre DX*)

WWBS was ready to start testing in mid-Sept on 11910 kHz only, 2300-0400 UTC to be expanded to 1100; QSL reports with return postage by P-mail only to PO Box 18174, Macon, GA 31209; inquiries may go to wwbsradio@aol.com (Hans Johnson, (c) *Cumbre DX*) Would clash with Budapest at 0000, 0230 at least (gh)

New on WGTG is *Church and State*, sort of a shortwave version of *Crossfire*, discussions between a liberal and a conservative with a moderator, Sun 1600-1700 on 9400 kHz; see **http://mypage.goplay.com/churchandstate/** (Jim Corsiatto, *World Of Radio*) If still there unchanged, winter timing would be 1700-1800

World Of Radio on WWCR as expected to be timeshifted for winter, based on September scheduling: Thu 1700 and 2130 on 15685 kHz, Sun 0730 and 1030 on 5070 kHz, Tue 1330 on 15685 kHz. For the latest see **http://www.angelfire.com/ok/worldofradio**

The AFRTS SSB relays allowed us to hear some good programming on SW: *The Savvy Traveler* was Sunday at 1700 on 12689.5, but the next week this had the music service on instead. *Into Tomorrow* with Dave Graveline, technology talk show, appeared Sunday 1006 on 4278.5 (gh)

For the S-98 season, WSHB moved from 18930 to 18910 kHz at 1600-1900 (Bob German, GJA, *Electronic DX Press*) website says staff reduced from 17 to 9 (Jim Moats, OH, *Review of International Broadcasting*)

Spectrum was to return in mid-Oct, same time as before, i.e. UT Sun 0200-0300 on WWCR 5070; winter 0300-0400 (Mark Emanuele, *Mike Jarmus Show* via Alex Draper)

Due to congessional funding delays, the new Radio Democracy for Africa service is not likely to start before late this year, more likely next year (Kim Andrew Elliott, VOA *Communications World*)

VENEZUELA R. Barquisimeto, 690, plans to reactivate SW 9510 starting in October in order to broadcast the 98-99 season Lara Cardinals baseball games to Venezuela and abroad; will also have website and RealAudio (three local newspapers via Dr. Luis A. Guerra Brandt, *Mundo Radial*) Same station previously publicized 9510 reactivation plans which never happened; maybe this time? (gh)

VIETNAM An historic stack of tapes of V. of Vietnam programs recorded between 1964 and 1971 has been acquired from Jack Bock, who was a civilian communications technician in Japan and Thailand during the Vietnam War. Static and jamming have been digitally cleaned up. Includes combat action reports, lists of American KIAs and POWs, anti-war activities, etc. For a catalog of the 68 tapes, available on cassette or reel-to-reel, send $1.50 to VVAW/Vietnam Veterans Radio Network, 7807 N. Avalon, Kansas City, MO 64152 (Doc Upton, alt.war.vietnam via Roger Tidy)

Until the Next, Best of DX and 73 de Glenn!

Broadcast Loggings

GLOBAL FORUM

Gayle Van Horn

0030 UTC on 9685
IRAN: VOIRI. English broadcast to 0127 sign off including // 9022; // 6050 not heard. (Lee Silvi, Mentor, OH) Audible at 1735 UTC on 7190. Poor signal quality, // 6025, 9695. International news in Arabic to ID. (Frank Hillton, Charleston, SC)

0050 UTC on 7335
VATICAN: Vatican Radio. Broadcast to southeast Asia, heard over top **CHU** Canada. English 0140-0200*, ID to unknown language 0100-0120. (Silvi, OH) 0140 on 9605 in Spanish. (Ronald A. Perron, Glen Burnie, MD) Vatican website: **<http://www.vatican.va>**

0058 UTC on 11800
ITALY: RAI Intl. News item on the *Music Festival* in Rome // 6010. (Bob Fraser, Cohasset, MA)

0105 UTC on 7415
USA: WBCQ Monticello, ME. Obscure rock music to station ID/location between music segments, plus address quote as, "WBCQ-The Planet, 97 High St., Kennebunk, ME 04043. (Harold Frodge, Midland, MI)

0125 UTC on 15410
AUSTRIA: Radio Austria Intl. German service, // 13730 at 0150. (Perron, MD) News on national metro system at 2150 on 13730. (Fraser, MA) **<http://www.orf.at/roi/>**

0151 UTC on 13700
FRANCE: Radio France Intl. Portuguese programming, // 13640 (French Guiana relay) French noted on 17620 at 1646. (Perron, MD) **<www.rfi.fr/>**

0200 UTC on 7450
GREECE: Voice of. Greek programming noted on // 9375, 9420. (Perron, MD) World news to national headlines and Greek folk music to 2349*. (Frodge, MI) Address: ERA-5, 432 Messogion Av., 153 42 Athens, Greece. (Perron, MD)

0254 UTC on 9705
MEXICO: XERMX/Radio Mexico Intl.. English programming including ranchera music, despite heterodyne interference from Radio Ethiopia on lower sideband. ID at 0300 with email address quote. (Paul Ormandy, Oamaru, New Zealand/*Hard Core DX*) Heard 1400 with ID to station address quote.(Larry Zamora, Garland, TX) Station website: **<http://www.telecommex.com/imer/rmi.html>**

0327 UTC on 4960
SAO TOME: Voice of America relay. VOA newscast to sign-off ID and address. (Frodge, MI)

0430 UTC on 4828
ZIMBABWE: ZBC. Poor signal though improving slightly for 30 minutes. Afro pops to English announcements. (Ormandy, NZ) Address: P.O. Box HG444, Highlands, Harare, Zimbabwe. $1.00 helpful for reply. *-ed.*

0756 UTC on 11784.88
INDONESIA: (Java) Voice of. Tune-in to tone signal at 0757, into English programming at 0800. Fair signal level, but disturbed by Brazilian **Radio Guaiba** on 11783.21 at 0900. (Al Quaglieri, Albany, NY) VO Indonesia heard on 15150, 1748-1755. (Mark Veldhuis, Borne, Netherlands/*HCDX*) Indo's **RRI-Tanjungkarang** (Sumatera) heard on 3395 in unknown dialect to kroncong interludes. (Liangas, GRC)

0813 UTC on 15294.7
MALAYSIA: Voice of. English news commentary to time check. Sports report to ID, freq schedule, into Bahasa Malaysian at 0830. (Veldhuis, NLD) Website: **<http://asiaconnect.com.my/rtm-net/>**

0945 UTC on 11804
BRAZIL: Radio Globo. Portuguese sports program. Lady announcer to jingles and commercials. Brazil's **Radio Record** on 9505.1, 2153-2158 with romantic ballads to ID. **Radio Universo** on 9565 at 2204. Interference from Indo's **RRI-Jakarta (Java)** on frequency. (Veldhuis, NLD)

1130 UTC on 5965
CANADA: BBC WS relay. *About Face* interview with Rev. Chad Varah-Founder of *Samaritans & Befrienders International.* (Fraser, MA) Sackville relay also noted on 6175 at 2317. (Eddie Muro, Cedarhurst, NY)

1307 UTC on 17545
ISRAEL: Kol Israel/Reshet Bet. Hebrew service of news and IDs as "Kol Israel." Fair signal. (Gianni Serra, Anzio, Italy/*The Four Winds*)

1337 UTC on 13710
INDIA: All India Radio-Bangalore. English world news to ID and editorial, poor signal. AIR-Hyderabad heard on 4800 at 1754. (Serra, Italy/*TFW*) URL:**<http://air.kode.net>**

1353 UTC on 15585
MADAGASCAR: Radio Netherlands relay. *Research File* program to *Dutch Press Review* segment. (Zamora, TX) **Netherland's Bonaire** relay audible on 15315 at 0126. (Perron, MD) RN website: **<http://www.rnw.nl>**

1432 UTC on 11785
QATAR: QBS. Arabic text and music, // 9570, fair signal quality. (Serra, Italy/*TFW*)

1500 UTC on 15560
RUSSIA: Voice of. *Focus on Asia & the Pacific* program to 1530. Russian text to 1600. (John Marko, Collingdale, PA) *Kaleidoscope* program on 11675 at 1935. (Fraser, MA)VOR website: **<http://www.vor.ru>** Heard 2020 on 11675 *Science & Engineering* program. (Fraser, MA)

1610 UTC on 11570
PAKISTAN: Radio Pakistan. English service editorial on Kashmir to 1613. Classical music bridge, frequency quote to slow speed English. **Azad Kashmir Radio** via Islamabad noted on 4790 at 1726. Talk to ID and announcements to 1752. (Serra, Italy/*TFW*)

1615 UTC on 11715
ALGERIA: Radio Algiers Intl. English world news to national briefs. Station ID to pop/rock music. Fair quality signal. (Hillton, SC)

1740 UTC on 4900
CHINA: Haixia Zhi Sheng # 2. Chinese talk to program pause for identification at 1746. Unidentified Chinese station on 5050 at 1757, mentions of Zhonguo, time tips 1800, talk and 1801*. (Serra, Italy/*TFW*)

1748 UTC on 21500
CHILE: Voz Cristiana. Spanish ID at tune-in, Florida address to program jingles and promos, // 21549.4 considerably weaker. (Veldhuis, NLD/*HCDX*; Serra, Italy/*TFW*)

1823 UTC on 3345
SOUTH AFRICA: AWR. Religious choir music to multilingual station IDs and AWR interval signal, 1830*. (Veldhuis, NLD/*HCDX*)

1912 UTC on 5935
LATVIA: Radio Latvia Intl. Poor signal for newscast format. Pop music to clear station ID, political commentary to 1920. Utility station interference. (Serra, Italy/*TFW*)

1959 UTC on 4965
ZAMBIA: Radio Christian Voice. Scripture readings to ID at 2000, "this is RCV broadcasting from Zambia." Good signal. (Zacharias Liangas, Thessaloniki, Greece)

1959 UTC on 13690
UK: Merlin Network One. Christopher England's show with pop music and commentary on the status of modern radio. (Frodge, MI)

2006 UTC on 9525
POLAND: Polish Radio Warsaw. Fair signal with audio buzz. Special on WWII *Battle of Britain.* Musical vocals to abrupt 2025*. (Frodge, MI)

2040 UTC on 15120
NIGERIA: Voice of. *Sixty Minutes* show of interviews and commentaries. Drum signal interval signal at 2100, into French service, VOA interference on 15110. (Frodge, MI)

2105 UTC on 15345
ARGENTINA: RAE. *Lottery Internacional* info to station frequencies quote. (Liangas, GRC)

2125 UTC on 4820
BOTSWANA: Radio Botswana. English music program to Roberta Flack tune. Regional language at 2140. Fair signal. (Liangas, GRC)

2130 UTC on 5003.5
EQT. GUINEA: Radio Africa. Religious programming to 2258 identification. National anthem to 2300 sign-off. (Veldhuis, NLD/*HCDX*)

2211 UTC on 3976.06
INDONESIA: (Kalimantan/Borneo) RRI-Pontianak. Tentative ID on station for announcer in Indonesian. Brief segment of Islamic music and text. Interval signal to identification format segment. (Veldhuis, NLD/*HCDX*)

2220 UTC on 9620
URUGUAY: SODRE. Audible only in LSB. (lower sideband) Spanish commentary to ID at 2225. English blues tune from B.B. King to male/female duo after 2235. (Frodge, MI)

2226 UTC on 3325
INDONESIA: (Kalimantan/Borneo) RRI-Palangkaraya. Gamelean music to Indonesian text. Interval signal to station ID, interference on frequency from presumed Guatemalan **Radio Maya de Barillas**. (Veldhuis, NLD/*HCDX*)

2245 UTC on 9639.95
VENEZUELA: Ecos del Torbes. Spanish. Fine signal for local ads, jingles and ID, //4980 fair. (Ruud Vos, Netherlands/*HCDX*)

Thanks to our contributors — Have you sent in YOUR logs?
Send to ***Gayle Van Horn,*** *c/o Monitoring Times (or e-mail gayle@grove.net)*
English broadcast unless otherwise noted.

Gayle Van Horn, gayle@grove.net

Adventist World Radio...

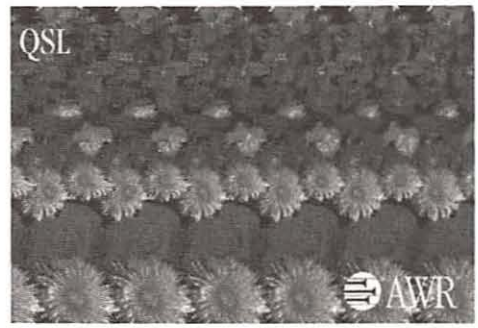
...The Voice of Hope For All Peoples. So says the opening message at the Adventist World Radio website. AWR is the international radio broadcast service of the Seventh-day Adventist church, devoting over twenty-five years of spreading the gospel through radio, particularly in countries where other means of evangelism are not possible.

The AWR website can be found at **<http://www.awr.org>** with station facts, information and links to *Broadcast Program Schedules*, *News & Letters*, and more.

Listener's Corner includes reception report forms and sample QSLs to view. Real Audio and photos of AWR sites are available.

Online reception reports are available at the *Shortwave Radio QSL* link **<http://www.awr.org/qsl.html>** as well as a printable reception report form and an informative article *How to Write a Reception Report*.

AWR is an excellent verifier and is generous with stickers and cards, as well as their monthly newsletter *Current*. Reports can be confirmed for their station's transmitters in Africa, Asia, Europe, Pan America and Russia. Addresses for each site are found on the AWR homepage. IRCs or mint stamps are appreciated. For additional station information send your letter to Adventist World Radio, International Relations, P.O. Box 29235, Indianapolis, IN 46229.



Need a new publication to complement your tropical DX sessions? The Danish Shortwave Club International has released their **1998 Tropical Band Survey**. Send ten International Reply Coupons (IRCs) to DSWCI, c/o Bent Nielsen, Egekrogen 14, DK 3500 Vaerloese, Denmark. Arranged by-frequency, plus station names and schedules, the *Tropical Band Survey* continues to be highly recommended by many DXers!

BELGIUM

Radio Vlaanderen Intl, unknown kHz. Full data card unsigned plus program schedule and sticker. Received in 20 days for an English report. Station address: P.O. Box 26, B-1000 Brussels, Belgium. (John Vercellino, Downers Grove, IL)

CUBA

Radio Havana, 6000 kHz. Full data QSL card unsigned plus personal letter signed by Lourdes Lopez, station pennant and newspaper *Granma Internacional*. Received in 153 days for a cassette tape and one U.S. dollar. Station address: Infanta 105, La Habana, Cuba. (Walt Szczepaniak, Philadelphia, PA)

FRENCH GUIANA

Radio France International relay, 13625 kHz. Full data color/Montsinery antenna card unsigned, plus a program schedule. Received in 21 weeks for an English report and souvenir postcard. Station address: Boite Postal 9516, F-75016 Paris, France. (Doug Merkel, St Louis, MO)

FM

WAUA-89.5 MHz FM. Full data prepared QSL card signed by Frank Hoffman, plus business card, and station stickers. Received in one month for an English FM report and mint stamps. Station address: West Virgina Public Radio, 600 Capitol St., Charleston, W VA 25301. (Robert S. Ross, Ontario, CAN/*AmFmTvDx*)

INDIA

All India Radio-Thiruvanathapuram 5010 kHz. Full data letter signed by Station Engineer (signature illegible). Received in 111 days on third English followup report, tape, postcard and souvenir used stamps. Report sent directly to station site: Thiruvananthapuram 695014, Kerala, India. (Charlie Washburn, North Perry, ME)

ITALY

AWR-the Voice of Hope, 7230 kHz. Full data color *Magic Eye* flower card unsigned. Religious brochures, stickers, schedule and letter enclosed. Station address: AWR-Europe, Box 383, 47100 Forli, Italy. (Sam Wright, Biloxi, MS)

JAPAN

Radio Japan, 11705 kHz. Full data QSL card signed by Y. Fushimi, plus map of Japan, program schedule and reception report forms. Received in 22 days for an English tape report. Station address: Tokyo 150-01, Japan. (Szczepaniak, PA)

MEDIUM WAVE

British Virgin Islands-ZBVI 780 kHz AM. Verification letter and card signed by Sandra Potter Warrican-Operations Manager. Station sticker, coverage map and station profile sheet enclosed. Station slogan is *The AM Advantage*. Received in 15 weeks for an English AM report. Station address: Website: **<http://www.zbvi.com>** Email:**<zbvi@caribsurf.com>** Ph: 284-494-2250. Fax: 284-494-1139 (Will Passmann, Muelheim, Germany/*HCDX*)

CBN 640 kHz AM. Full data map card signed by S. Williams. Received in 876 days for an English AM report and mint stamps (returned with reply). Station address: P.O. Box 12010-Station A, St John's NF Canada A1B 3TB.(Washburn,ME)

KDSX 1700 kHz AM. Full data verification on station letterhead signed by Hubert Beavers-Chief Operator KPLX-KLIF. Received in 90 days for an English AM report and a self-addressed stamped enveloped (used for reply). Station address: 3500 Maple Ave. # 1600, Dallas, TX. (Harold Frodge, Midland, MI)

KGIL 1260 kHz AM. Full data card signed by Elaine Hawkes-Asst. Engineer. Received in 4 days after an English followup report. Station address: P.O. Box 250028, Los Angeles, CA 90025. (Patrick Martin, Seaside, OR)

Radio Sport, 792 kHz Am-Hamilton, New Zealand. Full data verification letter received in 13 days for a taped report. Station runs 1 kW. Station address: 54 Cook St., P.O. Box 3526, Auckland, New Zealand. (Martin, OR)

Radio Universal, 1270 kHz AM. Full data verification signed by Adela Arroba de Dupre-Ing. Com. Received in 70 days for a Spanish AM report and one U.S.dollar. Station address: Casilla 5177, Guayaquil, Ecuador. (Paul Ormandy, Oamaru, New Zealand)

NEW ZEALAND

Radio New Zealand Intl 9795 kHz. Full data *New Zealand Birds* cards unsigned. Received in 23 days for an English report and three IRCs. Station address: P.O. Box 123, Wellington, New Zealand. (Washburn, ME)

PERU

Radio La Hora 4855 kHz. Verification letter signed by Sr. Carlos Gamarra M.-Director. Received for a Spanish report. Station address: Av. Garcilaso 411, Distrito de Wanchac, Cusco, Peru. (Mauno Ritola, Finland/*HCDX*)

SWEDEN

Teracom/Radio Sweden, 15235/17870 kHz. Full data color control room photo signed by H. Widenstedt. Verification for test transmissions. Received in two months for report sent via email. (Gayle Van Horn, Brasstown, NC) Teracom logo T-shirt, brochures, program schedules and signed business card from Magnus Nilsson-Frequency Management, R&D Department for test transmissions on 15240, 15235, 17870 kHz, via email. (Lex Jenkins, USA)

TURKEY

Voice of Turkey, 9655 kHz. Full data station card unsigned plus stickers, program schedule, station pennant, and brochure on Turkish cuisine. Received in 26 days for an English report. Station address: P.O. Box 333-06.443, Yenisehir, Ankara, Turkey. (Vercellino, IL)

UNITED STATES

WHRA-Greenbush, ME, 15460 kHz. Full data *Test QSL* card signed by James Holycross-Engineering. Received in 207 days for an English report of test transmissions, one mint stamp included. Station address: P.O. Box 12, South Bend, IN 46624 (Randy Stewart, Springfield, MO)

How to Use the Shortwave Guide

1: Convert your time to UTC.

Eastern and Pacific Times are already converted to Coordinated Universal Time (UTC) at the top of each page. The rule is: convert your local time to 24-hour format; add (during Standard Time) 5,6,7, or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (7:30 pm Eastern, 4:30 pm Pacific).

2: Choose a program or station you want to hear.

Some selected programs appear on the lower half of the page for prime listening hours—space does not permit 24-hour listings.

Occasionally program listings will be followed by "See X 0000." This information indicates that the program is a rerun, and refers to a previous summary of the program's content. The letter stands for a day of the week, as indicated below, and the four digits represent a time in UTC.

S: Sunday T: Tuesday H: Thursday A: Saturday
M: Monday W: Wednesday F: Friday

3: Find the frequencies for the program or station you want to hear.

Look at the page which corresponds to the time you will be listening. Comprehensive frequency information for English broadcasts can be found at the top half of the page. All frequencies are in kHz.

The frequency listing uses the same day codes as the program listings; if a broadcast is not daily, those day codes will appear before the station name. Irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

4: Choose the most promising frequencies for the time, location and conditions.

Not all stations can be heard and none all the time on all frequencies. To help you find the most promising frequency, we've included information on the target area of each broadcast. Frequencies beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible. Every frequency is followed by one of these target codes:

am:	The Americas	as:	Asia
na:	North America	au:	Australia
ca:	Central America	pa:	Pacific
sa:	South America	va:	various
eu:	Europe	do:	domestic broadcast
af:	Africa	om:	omnidirectional
me:	Middle East		

Consult the propagation charts. To further help you find the right frequency, we've included charts at the back of this section which take into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the region in which you live and find the chart for the region in which the station you want to hear is located. The chart indicates the optimum frequencies for a given time in UTC.

SWL Programs

Compiled by Jim Frimmel

Sundays

0000 WHRI (Angel 2 Indiana): "DXing with Cumbre"
0023 Radio Exterior de Espana: "Distance Unknown"
0030 BBC (as): "Write On"
0109 HCJB (am): "DX Partyline"
0123 Radio Exterior de Espana: "Distance Unknown"
0130 Radio For Peace Intl: "Continent of Media"
0200 Radio For Peace Intl: "World of Radio"
0234 Radio Havana Cuba: "DXers Unlimited"
0258 Vatican Radio: "On-the-Air"
0305 Australia, Radio: "Feedback"
0347 Radio Bulgaria: "Radio Bulgaria Calling"
0400 WHRI (Angel 2 Indiana): "DXing with Cumbre"
0409 HCJB (am): "DX Partyline"
0423 Voice of Turkey: "DX Corner" (biweekly)
0508 Vatican Radio: "On-the-Air"
0523 Radio Exterior de Espana: "Distance Unknown"
0530 Australia, Radio: "Media Report"
0530 WHRI (Angel 2 Indiana): "DXing with Cumbre"
0634 Radio Havana Cuba: "DXers Unlimited"
0700 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
0730 WWCR #3 (Tennessee): "World of Radio"
0830 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
0830 Radio For Peace Intl: "Continent of Media"
0835 Radio Vlaanderen Intl: "Radio World"
0836 Radio Korea: "Multiwave Feedback"
0900 Radio For Peace Intl: "World of Radio"
0905 BBC: "Write On"
1030 WWCR #3 (Tennessee): "World of Radio"
1038 Radio Korea: "Multiwave Feedback"
1130 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
1135 Radio Vlaanderen Intl: "Radio World"
1136 Radio Korea: "Multiwave Feedback"
1205 BBC: "Write On"
1207 Radio Canada Intl: "The Mailbag"
1236 Radio Korea: "Multiwave Feedback"
1247 Radio Bulgaria: "Radio Bulgaria Calling"
1335 Radio Vlaanderen Intl: "Radio World"
1337 Radio Canada Intl: "The Mailbag"
1354 Vatican Radio: "On-the-Air"
1400 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
1430 WHRI (Angel 1 Indiana): "DXing with Cumbre"
1515 BBC (af): "Waveguide" (4)
1636 Radio Korea: "Multiwave Feedback"
1637 Radio Canada Intl: "The Mailbag"
1705 BBC (as): "Write On"
1730 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
1730 WHRI (Angel 2 Indiana): "DXing with Cumbre"
1735 Radio Vlaanderen Intl: "Radio World"
1835 Radio Vlaanderen Intl: "Radio World"
1930 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
1936 Radio Korea: "Multiwave Feedback"
2031 Radio Canada Intl: "The Mailbag"
2105 BBC: "Write On"
2108 Radio Korea: "Multiwave Feedback"
2135 BBC (af): "Write On"
2300 KSDA (Guam): "Wavescan"
2300 Radio For Peace Intl: "World of Radio"
2330 Australia, Radio: "Media Report"
2330 WHRA (Angel 5 Maine): "DXing with Cumbre"

Mondays

0000 AWR Latin America: "Wavescan"
0106 Deutsche Welle: "World DX Meeting" (4/5)
0130 WRMI (Florida): "Wavescan"
0131 Radio Canada Intl: "The Mailbag"
0230 Radio Korea: "Multiwave Feedback"
0305 BBC: "Write On"
0407 Radio Canada Intl: "The Mailbag"
0700 Radio For Peace Intl: "World of Radio"
1040 All India Radio: "DX-ers Corner" (2/4)
1615 KTWR (Guam): "Pacific DX Report"
1730 WWCR #1 (Tennessee): "Ask WWCR"
1840 All India Radio: "DX-ers Corner" (2/4)
2130 All India Radio: "DX-ers Corner" (2/4)
2135 Radio New Zealand Intl: "Mailbox" (biweekly)
2200 WWCR #1 (Tennessee): "Ask WWCR"

Tuesdays

0030 BBC (as): "Waveguide" (4)
0900 KTWR (Guam): "Pacific DX Report"
1330 WWCR #1 (Tennessee): "World of Radio"
1346 Radio Sweden: "MediaScan" (1/3)
1355 FEBC (Philippines): "DX Dial"
1446 Radio Sweden: "MediaScan" (1/3)
1846 Radio Sweden: "MediaScan" (1/3)
1900 Radio For Peace Intl: "World of Radio"
2100 Polish Radio: "Polish Radio DX Club"
2111 Radio Havana Cuba: "DXers Unlimited"
2311 Radio Havana Cuba: "DXers Unlimited"
2340 All India Radio: "DX-ers Corner" (2/4)

Wednesdays

0140 Radio Havana Cuba: "DXers Unlimited"
0146 Radio Sweden: "MediaScan" (1/3)
0246 Radio Sweden: "MediaScan" (1/3)
0300 Radio For Peace Intl: "World of Radio"
0335 Radio Havana Cuba: "DXers Unlimited"
0346 Radio Sweden: "MediaScan" (1/3)
0535 Radio Havana Cuba: "DXers Unlimited"
0730 BBC (af): "Waveguide" (4)
0730 HCJB (eu): "Ham Radio Today"
0930 HCJB (pac): "Ham Radio Today"
1000 Radio For Peace Intl: "World of Radio"
1315 FEBC (Philippines): "DX Dial"
1735 Radio New Zealand Intl: "Mailbox" (biweekly)
1820 Argentina, RAE: "DX'ers Special"
1820 Polish Radio: "Polish Radio DX Club"
1900 Merlin Radio Network: "Media Zoo"
1930 HCJB (eu): "Ham Radio Today"
2000 Merlin Radio Network: "Media Zoo"
2206 Radio Budapest Intl: "DX Blockbuster"

Thursdays

0130 HCJB (am): "Ham Radio Today"
0239 Argentina, RAE: "DX'ers Special"
0345 Radio Budapest Intl: "DX Blockbuster"
0430 HCJB (am): "Ham Radio Today"
0545 BBC (am/eu): "Waveguide" (4)
0730 BBC (as): "Waveguide" (4)
0754 Radio Netherlands Intl: "Media Network"
0800 KTWR (Guam): "Pacific DX Report"
0953 Radio Netherlands Intl: "Media Network"
1153 Radio Netherlands Intl: "Media Network"
1320 Polish Radio: "Polish Radio DX Club"
1352 Radio Netherlands Intl: "Media Network"
1700 WWCR #1 (Tennessee): "World of Radio"
1753 Radio Netherlands Intl: "Media Network"
1954 Radio Netherlands Intl: "Media Network"
2115 BBC (as): "Waveguide" (4)
2130 WWCR #1 (Tennessee): "World of Radio"

Fridays

0053 Radio Netherlands Intl: "Media Network"
0253 Radio Netherlands Intl: "Media Network"
0345 BBC (as): "Waveguide" (4)
0453 Radio Netherlands Intl: "Media Network"
0915 BBC (am/eu): "Waveguide" (4)
1030 KTWR (Guam): "Pacific DX Report"
1930 Australia, Radio: "Media Report"
1930 Radio For Peace Intl: "Continent of Media"
1930 Radio New Zealand Intl: "Mailbox" (biweekly)
2000 Radio For Peace Intl: "World of Radio"
2047 Radio Bulgaria: "Radio Bulgaria Calling"
2100 WWCR #1 (Tennessee): "Ask WWCR"
2105 Australia, Radio: "Feedback"
2338 Voice of Turkey: "DX Corner" (biweekly)

Saturdays

0005 Australia, Radio: "Feedback"
0044 Radio Bulgaria: "Radio Bulgaria Calling"
0136 Voice of America (as pac/ca): "Communications World (A)"
0330 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
0330 Radio For Peace Intl: "Continent of Media"
0336 Voice of America (af): "Communications World (B)"
0400 Radio For Peace Intl: "World of Radio"
0400 WRMI (Florida): "Wavescan"
0438 Voice of Turkey: "DX Corner" (biweekly)
0530 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
0536 Voice of America: "Communications World (A)"
0600 WHRI (Angel 1/2 Indiana): "DXing with Cumbre"
0605 Australia, Radio: "Feedback"
0630 WHRA (Angel 5 Maine): "DXing with Cumbre"
0700 KWHR (Angel 3 Hawaii): "DXing with Cumbre"

(Continued on page 45)

Frequencies

0000-0100	Anguilla,Caribbean Beacon	6090am			
0000-0100	Australia, Radio	9660pa	12080as	15240pa	17715pa
		17795pa	21740pa		
0000-0100 vl	Australia, VL8K Katherine	5025do			
0000-0100 vl	Australia, VL8T Tent Crk	4910do			
0000-0100	Bulgaria, Radio	9485na	11720na		
0000-0015	Cambodia, Natl Radio Of	11940as			
0000-0100	Canada, CBC N Quebec Svc	9625do			
0000-0100	Canada, CFRX Toronto	6070do			
0000-0100	Canada, CFVP Calgary	6030do			
0000-0100	Canada, CHNX Halifax	6130do			
0000-0100	Canada, CKZN St John's	6160do			
0000-0100	Canada, CKZU Vancouver	6160do			
0000-0100	Costa Rica, Adv World R	5030am	9725am	15460am	
0000-0100	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0000-0027	Czech Rep, Radio Prague	5930na	7345na		
0000-0100	Ecuador, HCJB	9745na	12015na	21455am	
0000-0030	Egypt, Radio Cairo	9900am			
0000-0100	Germany,Overcomer Ministr	3975eu	9500as		
0000-0015 vl	Ghana, Ghana Broadc Corp	3366do	4915do		
0000-0045	India, All India Radio	7410as	9705as	9950as	11620as
0000-0100	Ireland, Unt Christian BC	6200do			
0000-0015	Japan, R Japan/NHK World	6155eu	6180eu	9665af	11705na
		11815as	13650as		
0000-0100	Liberia,LCN/R Liberia Int	5100do			
0000-0100	Malaysia, Radio	7295do			
0000-0100 vl	Namibia, NBC	3270af	3289af		
0000-0030	Netherlands, Radio	6020na	6165na	9845na	
0000-0100	New Zealand, R NZ Intl	17675pa			
0000-0100	North Korea, R Pyongyang	11845am	13650am	15230am	
0000-0100 vl	Papua New Guinea, NBC	9675do			
0000-0100	Philippines, FEBC/R Intl	15450as			
0000-0100	Singapore,RCorp Singapore	6150do			
0000-0100	Spain, R Exterior Espana	6055am			
0000-0100	Thailand, Radio	9655as	11905as	15395na	

0000-0100	UK, BBC Asian Service	3915as	6195as	7110as	9410as
		11945as	11955as	15280as	15310as
		15360as	17790as		
0000-0100	UK, BBC World Service	5970sa	5975am	6175na	9590am
		9915sa	12095sa		
0000-0100 t	UK, Merlin Network One	9645eu	11985na	13690na	
0000-0100	USA, Armed Forces Network	4278am	6458am	12689am	
0000-0100	USA, KAIJ Dallas TX	13815am			
0000-0100	USA, KTBN Salt Lk City UT	7510am			
0000-0100	USA, Voice of America	7215as	9770as	11760as	15185as
		15290as	17735as	17820as	
0000-0030 twhfa	USA, Voice of America	5995am	6130ca	7405am	9455ca
		9775am	11695ca	13740am	
0000-0100	USA, WBCQ Monticello ME	7415na			
0000-0100	USA, WEWN Birmingham AL	5825na	9975eu	13615na	
0000-0100 stwhfa	USA, WGTG McCaysville GA	5085am			
0000-0100	USA, WHRA Greenbush ME	15460af			
0000-0100	USA, WHRI Noblesville IN	5745am			
0000-0100	USA, WINB Red Lion PA	13790am			
0000-0100	USA, WRMI/R Miami Intl	9955ca			
0000-0100 s	USA, WRNO New Orleans LA	7355am			
0000-0100 wfas	USA, WSHB Cypress Crk SC	7535am			
0000-0100 wf	USA, WSHB Cypress Crk SC	15285am			
0000-0100	USA, WWBS Macon GA	11910na			
0000-0100	USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
0000-0100	USA, WYFR Okeechobee FL	5950na	6085na	9505na	
0010-0020	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0015-0100	Japan, R Japan/NHK World	6155eu	6180eu	9665af	11705na
0030-0100	Austria, R Austria Intl	9655na			
0030-0100	Iran, VOIRI	6055eu	9022eu	9685eu	
0030-0100	Netherlands, Radio	6020na	6165na	9845na	9855as
		11655as	12090as		
0030-0100	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0030-0100	UK, BBC Asian Service	9410as	11955as		
0045-0100	Albania, R Tirana Intl	6115na	7160na		
0050-0100	Italy, RAI Intl	6010na	9675na	11800na	

Selected Programs

Sundays

0000 Australia, Radio: RA News. Five or ten minutes of world, Australian, and regional news.
0000 Japan, NHK/Radio: News. World news from NHK International.
0000 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0005 Australia, Radio: Money, Markets, and the Economy.
0010 Japan, NHK/Radio: Hello from Tokyo. The weekend magazine program.
0030 Australia, Radio: Correspondents' Report. The ABC's foreign correspondents report home with Hamish Robertson.

Mondays

0000 Australia, Radio: RA News. See S 0000.
0000 Japan, NHK/Radio: News. See S 0000.
0000 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0010 Australia, Radio: Correspondents' Report. See S 0030.
0015 Japan, NHK/Radio: 44 Minutes. The weekday magazine program of feature reports and the popular vocal music of Japan.
0017 Japan, NHK/Radio: Guest Corner. The first segment of the magazine program "44 Minutes" features a conversation with a visitor.
0030 Australia, Radio: The Health Report. A program that examines health issues and makes complex scientific data understandable.
0034 Japan, NHK/Radio: Close Up. Featuring a Japanese person of note.
0047 Japan, NHK/Radio: News Commentary. An editorial opinion on the current news.
0052 Japan, NHK/Radio: Tumbling Dice. Focus on a topic of interest in Japan.

Tuesdays

0000 Australia, Radio: RA News. See S 0000.
0000 Japan, NHK/Radio: News. See S 0000.
0000 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0010 Australia, Radio: Asia Pacific. See S 2310.
0015 Japan, NHK/Radio: 44 Minutes. See M 0015.
0017 Japan, NHK/Radio: Guest Corner. See M 0017.
0030 Australia, Radio: The Law Report. Susanna Lobez brings an insider's perspective to the complexities of the law.
0034 Japan, NHK/Radio: Close Up. See M 0034.
0047 Japan, NHK/Radio: News Commentary. See M 0047.
0052 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Wednesdays

0000 Australia, Radio: RA News. See S 0000.
0000 Japan, NHK/Radio: News. See S 0000.
0000 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0010 Australia, Radio: Asia Pacific. See S 2310.
0015 Japan, NHK/Radio: 44 Minutes. See M 0015.
0017 Japan, NHK/Radio: Guest Corner. See M 0017.
0030 Australia, Radio: The Religion Report. Hosted by John Cleary.
0034 Japan, NHK/Radio: Close Up. See M 0034.
0047 Japan, NHK/Radio: News Commentary. See M 0047.
0052 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Thursdays

0000 Australia, Radio: RA News. See S 0000.
0000 Japan, NHK/Radio: News. See S 0000.
0000 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0010 Australia, Radio: Asia Pacific. See S 2310.
0015 Japan, NHK/Radio: 44 Minutes. See M 0015.
0017 Japan, NHK/Radio: Guest Corner. See M 0017.
0030 Australia, Radio: Media Report. Agnes Warren presents the inside story on how the communications industry operates and puts the spotlight on media people and their activities.
0034 Japan, NHK/Radio: Close Up. See M 0034.
0047 Japan, NHK/Radio: News Commentary. See M 0047.
0052 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Fridays

0000 Australia, Radio: RA News. See S 0000.
0000 Japan, NHK/Radio: News. See S 0000.
0000 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0010 Australia, Radio: Asia Pacific. See S 2310.
0015 Japan, NHK/Radio: 44 Minutes. See M 0015.
0017 Japan, NHK/Radio: Guest Corner. See M 0017.
0030 Australia, Radio: Sports Report. Twenty minutes of news from the world of sports.
0034 Japan, NHK/Radio: Close Up. See M 0034.
0047 Japan, NHK/Radio: News Commentary. See M 0047.
0052 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Saturdays

0000 Australia, Radio: RA News. See S 0000.
0000 Japan, NHK/Radio: News. See S 0000.
0000 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0005 Australia, Radio: Feedback. See S 0305.
0010 Japan, NHK/Radio: Asia Weekly. See S 1410.
0030 Australia, Radio: Asia Pacific. See S 2310.

Hauser's Highlights
KUWAIT: R. Kuwait

Main Programme in Arabic:

UTC	kHz
0000-0200	11675
0200-0359	15495, 11675, 6055
0359-0900	15505, 15495, 15110(0445-), 11675(-0530), 6055
0900-1305	17885, 15505, 15495, 15110(-0930), 13620, 6055
1305-1605	17885(-1505), 15505, 15110, 13620, 9880
1605-1800	15505(-1740), 15110(-1730), 11990(1615-), 9880
1800-2300	15505, 15495, 9880(-2130), 9855; 2300-2400 15495, 9855

in English:
1800-2100 11990
(BBC Monitoring)

Frequencies

0100-0200	Anguilla,Caribbean Beacon	6090am			
0100-0200	Australia, Radio	9660pa	12080as	15240pa	15415as
		17715pa	17750as	17795pa	21740pa
0100-0200 vl	Australia, VL8K Katherine	5025do			
0100-0200 vl	Australia, VL8T Tent Crk	4910do			
0100-0200	Canada, CBC N Quebec Svc	9625do			
0100-0200	Canada, CFRX Toronto	6070do			
0100-0200	Canada, CFVP Calgary	6030do			
0100-0200	Canada, CHNX Halifax	6130do			
0100-0200	Canada, CKZN St John's	6160do			
0100-0200	Canada, CKZU Vancouver	6160do			
0100-0129	Canada, R Canada Intl	5960am	9535am	9755am	11715am
		13670am			
0100-0200	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0100-0105	Croatia, Croatian Radio	9925am			
0100-0200	Cuba, Radio Havana	6000na	9820na	13605na	
0100-0127	Czech Rep, Radio Prague	6200na	7345na		
0100-0200	Ecuador, HCJB	9745na	12015na	21455am	
0100-0150	Germany, Deutsche Welle	6040na	6085na	6145na	9640na
		11810am			
0100-0200 s	Germany,Good News World R	9855eu			
0100-0200	Germany,Overcomer Ministr	3975eu	9500as		
0100-0115	Ghana, Ghana Broadc Corp	3366do	4915do		
0100-0200 vl	Guatemala, Radio Cultural	3300do			
0100-0200	Indonesia, Voice of	9525as	11765as	15510as	
0100-0125	Iran, VOIRI	7260eu	9022eu	9685eu	
0100-0200	Ireland, Unt Christian BC	6200do			
0100-0110	Italy, RAI Intl	6010na	9675na	11800na	
0100-0200	Japan, R Japan/NHK World	6150af	11860as	11890me	15570as
		15590as	17810as	17835sa	21610pa
		21670pa			
0100-0200	Liberia,LCN/R Liberia Int	5100do			
0100-0200	Malaysia, Radio	7295do			
0100-0200 vl	Namibia, NBC	3270af	3289af		
0100-0125	Netherlands, Radio	6020na	6165na	9845na	9855as
		11655as	12090as		
0100-0200	New Zealand, R NZ Intl	17675pa			
0100-0200 vl	Papua New Guinea, NBC	9675do			
0100-0200	Philippines, FEBC/R Intl	15450as			
0100-0130 mtwhfa	Serbia, Radio Yugoslavia	9580na	11870na		
0100-0200	Singapore,RCorp Singapore	6150do			
0100-0130	Slovakia, R Slovakia Intl	5930na	7300af	9440sa	
0100-0200	Spain, R Exterior Espana	6055am			
0100-0200	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0100-0130	Switzerland, Swiss R Intl	9885na	9905ca		
0100-0200	UK, BBC Asian Service	5965as	6195as	9410as	9605as
		11955as	15280as	15310as	15360as
0100-0200	UK, BBC World Service	5970sa	5975am	6175na	9590am
		9915sa	12095sa		
0100-0200	Ukraine, R Ukraine Intl	5905eu	5915eu	6020eu	7180na
		7240eu	9445na	12050na	
0100-0200	USA, Armed Forces Network	4278am	6458am	12689am	
0100-0200	USA, KAIJ Dallas TX	5810am			
0100-0200	USA, KTBN Salt Lk City UT	7510am			
0100-0200	USA, Voice of America	7110as	7200as	9635as	11705as
		11725as	11820as	15250as	17740as
		17820as			
0100-0200 twhfa	USA, Voice of America	5995am	6130am	7405am	9455am
		9775am	13740am		
0100-0200	USA, WBCQ Monticello ME	7415na			
0100-0200	USA, WEWN Birmingham AL	5825eu	13615na		
0100-0200 stwhfa	USA, WGTG McCaysville GA	5085am			
0100-0200	USA, WHRI Noblesville IN	5745am	7315am		
0100-0200	USA, WINB Red Lion PA	11950am			
0100-0200	USA, WJCR Upton KY	7490na	13595na		
0100-0200	USA, WRMI/R Miami Intl	9955ca			
0100-0200 twhfas	USA, WSHB Cypress Crk SC	7535am			
0100-0200	USA, WWBS Macon GA	11905na			
0100-0200	USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
0100-0200	USA, WYFR Okeechobee FL	6065na	9505na	15165as	
0100-0130	Uzbekistan, R Tashkent	7190as	9375as	9530as	9715as
0100-0127	Vietnam, Voice of	5940am	7250am		
0125-0200	Netherlands, Radio	9855as	11655as	12090as	
0129-0159	Canada, R Canada Intl	5960am	9755am		
0129-0159 sm	Canada, R Canada Intl	9535am	11715am	13670am	
0130-0200	Albania, R Tirana Intl	6246na	7160na		
0130-0150	Greece, Voice of	7450na	9375na	9420na	11645na
0130-0200	Lithuania, Radio Vilnius	9855am			
0130-0200	Sweden, Radio	9435as	11985au		
0140-0200	Vatican State, Vatican R	5980as	7335as	9650as	

Selected Programs

Sundays

0100 Australia, Radio: RA News. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0100 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0100 USA, KJES (Mesquite NM): Religious Chanting.
0105 Australia, Radio: The Europeans. Maria Zijlstra presents reports and features on aspects of European politics, culture and society.
0110 Japan, NHK/Radio: Hello from Tokyo. See S 0010.

Mondays

0100 Australia, Radio: RA News. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0100 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0100 USA, KJES (Mesquite NM): Religious Chanting.
0110 Australia, Radio: Awaye. Lorena Allam hosts a program of indigenous arts and issues.
0115 Japan, NHK/Radio: 44 Minutes. See M 0015.
0117 Japan, NHK/Radio: Guest Corner. See M 0017.
0134 Japan, NHK/Radio: Close Up. See M 0034.
0147 Japan, NHK/Radio: News Commentary. See M 0047.
0152 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Tuesdays

0100 Australia, Radio: RA News. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0100 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0100 USA, KJES (Mesquite NM): Religious Chanting.
0110 Australia, Radio: Science Show. Robyn Williams presents the world of science, both at home and abroad.
0115 Japan, NHK/Radio: 44 Minutes. See M 0015.
0117 Japan, NHK/Radio: Guest Corner. See M 0017.
0134 Japan, NHK/Radio: Close Up. See M 0034.
0147 Japan, NHK/Radio: News Commentary. See M 0047.
0152 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Wednesdays

0100 Australia, Radio: RA News. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0100 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0100 USA, KJES (Mesquite NM): Religious Chanting.
0110 Australia, Radio: Australia Talks. See T 0110.
0115 Japan, NHK/Radio: 44 Minutes. See M 0015.
0117 Japan, NHK/Radio: Guest Corner. See M 0017.
0134 Japan, NHK/Radio: Close Up. See M 0034.
0147 Japan, NHK/Radio: News Commentary. See M 0047.
0152 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Thursdays

0100 Australia, Radio: RA News. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0100 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0100 USA, KJES (Mesquite NM): Religious Chanting.
0110 Australia, Radio: Background Briefing. Australia's top award-winning current affairs program.
0115 Japan, NHK/Radio: 44 Minutes. See M 0015.
0117 Japan, NHK/Radio: Guest Corner. See M 0017.
0134 Japan, NHK/Radio: Close Up. See M 0034.
0147 Japan, NHK/Radio: News Commentary. See M 0047.
0152 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Fridays

0100 Australia, Radio: RA News. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0100 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0100 USA, KJES (Mesquite NM): Religious Chanting.
0110 Australia, Radio: Hindsight. See H 1605.
0115 Japan, NHK/Radio: 44 Minutes. See M 0015.
0117 Japan, NHK/Radio: Guest Corner. See M 0017.
0134 Japan, NHK/Radio: Close Up. See M 0034.
0147 Japan, NHK/Radio: News Commentary. See M 0047.
0152 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Saturdays

0100 Australia, Radio: RA News. See S 0000.
0100 Japan, NHK/Radio: News. See S 0000.
0100 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0100 USA, KJES (Mesquite NM): Religious Chanting.
0105 Australia, Radio: Oz Sounds #1. See S 0505.
0110 Japan, NHK/Radio: Weekend Break. A magazine program featuring stories from around Japan.
0130 Australia, Radio: Arts Australia. See T 2330.

Hauser's Highlights

GABON: Africa No. 1

Daily in French:

UTC	kHz
0500-0700	9580
0700-1600	17630, 9580
1600-2100	15475, 9580
2100-2400	9580

News summaries on the hour, and 15-min African newscasts at 0530, 0630, 0730, 1115, 1215, 1830, 2200 UTC;
http://www.africa1.com
(BBC Monitoring)

Frequencies

0200-0300	Anguilla,Caribbean Beacon	6090am			
0200-0300 twhfa	Argentina, RAE	11710am			
0200-0300	Australia, Radio	9660pa	11880as	12080as	15240pa
		15415as	15510pa	17715pa	17750as
		21725pa			
0200-0300 vl	Australia, VL8K Katherine	5025do			
0200-0300 vl	Australia, VL8T Tent Crk	4910do			
0200-0300	Canada, CBC N Quebec Svc	9625do			
0200-0300	Canada, CFRX Toronto	6070do			
0200-0300	Canada, CFVP Calgary	6030do			
0200-0300	Canada, CHNX Halifax	6130do			
0200-0300	Canada, CKZN St John's	6160do			
0200-0300	Canada, CKZU Vancouver	6160do			
0200-0229	Canada, R Canada Intl	9535am	9755am	11715am	13670am
0200-0300 twhfa	Colombia, Rdif Nacional	4955va			
0200-0300	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0200-0205	Croatia, Croatian Radio	9925am			
0200-0300	Cuba, Radio Havana	6000na	9820na	13605na	
0200-0300	Ecuador, HCJB	9745na	12015na	21455am	
0200-0300	Egypt, Radio Cairo	9475na			
0200-0250	Germany, Deutsche Welle	7285as	9615as	9690as	11945as
		11965as	12045as		
0200-0300	Germany,Overcomer Ministr	3975eu	9500as		
0200-0230	Hungary, Radio Budapest	9580na	11685na		
0200-0300	Ireland, Unt Christian BC	6200do			
0200-0300	Kenya, Kenya Broadc Corp	4885do	4935do		
0200-0230	Lithuania, Radio Vilnius	9855am			
0200-0300	Malaysia, Radio	7295do			
0200-0250	Myanmar, Radio	7185do			
0200-0300 vl	Namibia, NBC	3270af	3289af		
0200-0225	Netherlands, Radio	9855as	11655as	12090as	
0200-0300	New Zealand, R NZ Intl	17675pa			
0200-0300 vl	Papua New Guinea, NBC	9675do			
0200-0300	Philippines, FEBC/R Intl	15450as			
0200-0300	Romania, R Romania Intl	6155na	9570na	9690as	11740as
		11940as	15380as		
0200-0300	Russia,Voice of Russia WS	7105na	12050na	15425na	15520na
0200-0300	Singapore,RCorp Singapore	6150do			
0200-0300	South Korea, R Korea Intl	7275am	11725am	11810am	15575am
0200-0300	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0200-0300	Taiwan, Radio Taipei Intl	5950na	9680na	11740am	11825pa
		15345as			
0200-0300 vl	Tanzania, Radio	5050do			
0200-0300	UK, BBC African Service	6135af			
0200-0300	UK, BBC Asian Service	9605as	11955as	15280as	15310as
		15360as			
0200-0300	UK, BBC World Service	5970sa	5975am	6175na	6195eu
		9410eu	9590am	9915sa	
0200-0300	USA, Armed Forces Network	4278am	6458am	12689am	
0200-0300	USA, KAIJ Dallas TX	5810am			
0200-0300	USA, KJES Mesquite NM	7555am			
0200-0300	USA, KTBN Salt Lk City UT	7510am			
0200-0300	USA, Voice of America	7115as	7200as	11705as	11725as
		11820as	15250as	17740as	17820as
0200-0300	USA, WBCQ Monticello ME	7415na			
0200-0300	USA, WEWN Birmingham AL	5825eu	13615na		
0200-0300 stwhfa	USA, WGTG McCaysville GA	5085am			
0200-0300	USA, WHRI Noblesville IN	5745am	7315am		
0200-0300	USA, WINB Red Lion PA	11950am			
0200-0300	USA, WJCR Upton KY	7490na	13595na		
0200-0300 vl	USA, WRMI/R Miami Intl	9955ca			
0200-0300	USA, WRNO New Orleans LA	7355na			
0200-0300 s	USA, WSHB Cypress Crk SC	5850na			
0200-0300 h	USA, WSHB Cypress Crk SC	7535am			
0200-0300	USA, WWBS Macon GA	11905na			
0200-0300	USA, WWCR Nashville TN	3215am	5070am	5935am	7435am
0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0215-0225	Nepal, Radio	5005do	7165do		
0225-0300	Netherlands, Radio	9855as	11655as		
0229-0259 sm	Canada, R Canada Intl	9535am	9755am	11715am	13670am
0230-0300	Austria, R Austria Intl	9655na	9870sa	13730sa	
0230-0257	Czech Rep, Radio Prague	9480me	11600as		
0230-0245	Pakistan, Radio	7485as	11975as	15489as	
0230-0300 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0230-0300	Sweden, Radio	7135am	9495am		
0230-0300	UK, BBC World Service	9895am			
0230-0300	Vietnam, Voice of	5940am			
0250-0300 sf	Greece, Voice of	7450na	9375na	9420na	11645na
0250-0300	Vatican State, Vatican R	7305ca	9605am		

Selected Programs

Sundays

0200 Australia, Radio: RA News. See S 0000.
0200 South Korea, R Korea Intl: News. Seven or ten minutes of world and regional news.
0200 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0200 USA, KJES (Mesquite NM): Religious Chanting.
0210 Australia, Radio: Fine Music Australia. The best Australian fine music performances and compositions are presented by Ivan Lloyd.
0215 South Korea, R Korea Intl: News Commentary. Opinion on developments in Korea and worldwide.
0220 South Korea, R Korea Intl: Music Trap. The most popular music of South Korea.
0230 Australia, Radio: Innovations. Desley Blanch reports on Australian inventions and innovative practices.
0240 South Korea, R Korea Intl: From Us to You. Listener letters, questions, comments, Q&A Corner and Music Request.

Mondays

0200 Australia, Radio: RA News. See S 0000.
0200 South Korea, R Korea Intl: News. See S 0200.
0200 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0200 USA, KJES (Mesquite NM): Religious Chanting.
0210 Australia, Radio: The World Today (Part 1). Tony Eastley with current affairs updates.
0210 South Korea, R Korea Intl: Echoes of Korean Music. See S 1610.
0230 South Korea, R Korea Intl: Multiwave Feedback. See S 1636.

Tuesdays

0200 Australia, Radio: RA News. See S 0000.
0200 South Korea, R Korea Intl: News. See S 0200.
0200 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0200 USA, KJES (Mesquite NM): Religious Chanting.
0210 Australia, Radio: The World Today (Part 1). See M 0210.
0215 South Korea, R Korea Intl: News Commentary. See S 0215.
0215 South Korea, R Korea Intl: Seoul Calling. See M 1615.
0237 South Korea, R Korea Intl: Economic News Briefs. See M 1640.
0242 South Korea, R Korea Intl: Notes of Nostalgia. See M 1645.

Wednesdays

0200 Australia, Radio: RA News. See S 0000.
0200 South Korea, R Korea Intl: News. See S 0200.
0200 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0200 USA, KJES (Mesquite NM): Religious Chanting.
0210 Australia, Radio: The World Today (Part 1). See M 0210.
0215 South Korea, R Korea Intl: News Commentary. See S 0215.
0220 South Korea, R Korea Intl: Seoul Calling. See M 1615.
0240 South Korea, R Korea Intl: Economic News Briefs. See M 1640.
0245 South Korea, R Korea Intl: Cultural Promenade. See T 1645.

Thursdays

0200 Australia, Radio: RA News. See S 0000.
0200 South Korea, R Korea Intl: News. See S 0200.
0200 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0200 USA, KJES (Mesquite NM): Religious Chanting.
0210 Australia, Radio: The World Today (Part 1). See M 0210.
0210 South Korea, R Korea Intl: News Commentary. See S 0215.
0216 South Korea, R Korea Intl: Seoul Calling. See M 1615.
0237 South Korea, R Korea Intl: Economic News Briefs. See M 1640.
0241 South Korea, R Korea Intl: Reaching Forward. See W 1645.

Fridays

0200 Australia, Radio: RA News. See S 0000.
0200 South Korea, R Korea Intl: News. See S 0200.
0200 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0200 USA, KJES (Mesquite NM): Religious Chanting.
0210 Australia, Radio: The World Today (Part 1). See M 0210.
0210 South Korea, R Korea Intl: News Commentary. See S 0215.
0215 South Korea, R Korea Intl: Seoul Calling. See M 1615.
0240 South Korea, R Korea Intl: Economic News Briefs. See M 1640.
0245 South Korea, R Korea Intl: Tales from Korea's Past. See H 1645.

Saturdays

0200 Australia, Radio: RA News. See S 0000.
0200 South Korea, R Korea Intl: News. See S 0200.
0200 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0200 USA, KJES (Mesquite NM): Religious Chanting.
0205 Australia, Radio: Ockham's Razor. See S 0605.
0215 South Korea, R Korea Intl: Let's Learn Korean!. See F 1630.
0217 South Korea, R Korea Intl: Sites and Sounds. See F 1620.
0230 Australia, Radio: Earthbeat. Peter Jacklyn examines environmental issues of the region from a scientific perspective.
0236 South Korea, R Korea Intl: Globalizing Korea. See F 1645.

Frequencies

0300-0400	Anguilla,Caribbean Beacon	6090am			
0300-0400	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21725pa
0300-0400 vl	Australia, VL8K Katherine	5025do			
0300-0400 vl	Australia, VL8T Tent Crk	4910do			
0300-0400	Australia,DefenseForces R	14790as			
0300-0330 smwfa	Belarus, R Belarus Intl	7210eu	11960eu		
0300-0400	Bulgaria, Radio	9485na	11720na		
0300-0400 vl	Canada, CBC N Quebec Svc	9625do			
0300-0400	Canada, CFRX Toronto	6070do			
0300-0400	Canada, CFVP Calgary	6030do			
0300-0400	Canada, CHNX Halifax	6130do			
0300-0400	Canada, CKZN St John's	6160do			
0300-0400	Canada, CKZU Vancouver	6160do			
0300-0400	China, China Radio Intl	9690am			
0300-0400	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0300-0305	Croatia, Croatian Radio	9925na			
0300-0400	Cuba, Radio Havana	6000na	9820na	13605na	
0300-0327	Czech Rep, Radio Prague	7345na	9435na		
0300-0400	Ecuador, HCJB	9745na	12015na	21455am	
0300-0330	Egypt, Radio Cairo	9475am			
0300-0350	Germany, Deutsche Welle	6085na	6145na	6185na	9535na
		9640na			
0300-0400	Germany,Overcomer Ministr	3975eu	9500as		
0300-0400 vl	Guatemala, Radio Cultural	3300do			
0300-0400 irreg	Iraq, Radio Iraq Intl	11785eu			
0300-0400	Ireland, Unt Christian BC	6200do			
0300-0400 as/vl	Italy, IRRS	7120va			
0300-0400	Japan, R Japan/NHK World	17685pa	17825ca	17855as	
0300-0400	Kenya, Kenya Broadc Corp	4885do	4935do		
0300-0315 thfa/vl	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0300-0400 vl	Lesotho, Radio Lesotho	4800do			
0300-0400	Malaysia, Radio	7295do			
0300-0325	Moldova, R Moldova Intl	7520na			
0300-0400 vl	Namibia, NBC	3270af	3289af		
0300-0325	Netherlands, Radio	9855as	11655as		
0300-0400	New Zealand, R NZ Intl	17675pa			
0300-0400 vl	Papua New Guinea, NBC	9675do			
0300-0330 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0300-0400	Russia,Voice of Russia WS	7105na	12050na	15425na	15520na
0300-0330	S Africa, Channel Africa	5955af			
0300-0400	Singapore,RCorp Singapore	6150do			
0300-0400	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0300-0400	Taiwan, Radio Taipei Intl	5950na	9680na	11745as	11825as
		15345as			
0300-0400 vl	Tanzania, Radio	5050do			
0300-0330	Thailand, Radio	9655am	11905am	15395na	
0300-0315 mtwhf	Uganda, Radio	4976do			
0300-0400	UK, BBC African Service	3255af	6005af	6190af	9600af
		11730af			
0300-0400	UK, BBC Asian Service	9605as	15310as	15360as	17790as
		21660as			
0300-0330	UK, BBC World Service	5970sa	5975am	6175na	6195eu
		9410eu	9895am	9915sa	11760me
		12095me			
0300-0400	USA, Armed Forces Network	4278am	6458am	12689am	
0300-0400	USA, KAIJ Dallas TX	5810am			
0300-0330	USA, KJES Mesquite NM	7555am			
0300-0400	USA, KTBN Salt Lk City UT	7510am			
0300-0400	USA, Voice of America	6080af	6115af	7105af	7275af
		7290af	7340af	9575af	9885af
		11695af			
0300-0330 smtwh	USA, Voice of America	4960af			
0300-0400	USA, WBCQ Monticello ME	7415na			
0300-0400	USA, WEWN Birmingham AL	5825eu			
0300-0400 stwhfa	USA, WGTG McCaysville GA	5085am			
0300-0400	USA, WHRI Noblesville IN	5745am	7315am		
0300-0400	USA, WINB Red Lion PA	11950am			
0300-0400	USA, WJCR Upton KY	7490na	13595na		
0300-0400	USA, WRMI/R Miami Intl	9955ca			
0300-0400	USA, WRNO New Orleans LA	7355na			
0300-0400 twhfas	USA, WSHB Cypress Crk SC	5850na			
0300-0400	USA, WWBS Macon GA	11905na			
0300-0400	USA, WWCR Nashville TN	3215am	5070am	5935am	7435am
0300-0400	USA, WYFR Okeechobee FL	6065na	9505na		
0300-0310	Vatican State, Vatican R	7305ca	9605am		
0300-0400	Zambia, Natl BC Corp	6165do	6265do		
0300-0400 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0310-0340	Vatican State, Vatican R	7360af	9660af		
0330-0357	Czech Rep, Radio Prague	9480va	11600as		
0330-0400	Finland, YLE/R Finland	9780eu	11900am		
0330-0400	Hungary, Radio Budapest	9840na	11910na		
0330-0400 vl	Philippines, R Pilipinas	13770as	15330as	17730as	
0330-0400	Sweden, Radio	9475am	11665am		
0330-0355	UAE, Radio Dubai	12005na	13675na	15400na	
0330-0400	UK, BBC African Service	9610af			
0330-0400	UK, BBC Asian Service	11955as	15280as	15310as	
0330-0400	UK, BBC World Service	5975am	6175na	9895am	11760me
		12095me			
0330-0400 s	UK, BBC World Service	6180eu	6195eu	9410eu	
0330-0400	Vietnam, Voice of	5905am	7260am		
0340-0350	Greece, Voice of	7450na	9375na	9420na	11645na
0345-0400	Tajikistan, Radio	7245as	9905as	11620as	
0345-0400 as	Uganda, Radio	4976do			
0356-0400	Zambia, Christian Voice	3330af	6065af		

Selected Programs

Sundays

0300 Australia, Radio: RA News. See S 0000.
0300 Radio Taiwan International: News. Twelve minutes of world news.
0300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0305 Australia, Radio: Feedback. Roger Broadbent answers letters and discusses new programs, reception problems, and questions about Australia.
0315 Radio Taiwan International: Kaleidoscope. Spotlight on life in Taiwan.
0330 Australia, Radio: Correspondents' Report. See S 0030.
0330 Radio Taiwan International: Reflections. The best of Chinese literature.
0345 Radio Taiwan International: Let's Learn Chinese. Chinese lessons with commentary and translation in English.

Mondays

0300 Australia, Radio: RA News. See S 0000.
0300 Radio Taiwan International: News. See S 0300.
0300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0310 Australia, Radio: Australia Talks Back. Australians talking about issues of the day with Sandy McCutcheon.
0315 Radio Taiwan International: Food, Poetry and Others. The program in which host Paula Chao talks about her personal interests.
0330 Radio Taiwan International: Mailbag Time. Host Carlton Wong reads letters from listeners and plays music requests.
0345 Radio Taiwan International: Let's Learn Chinese. See S 0345.

Tuesdays

0300 Australia, Radio: RA News. See S 0000.
0300 Radio Taiwan International: News. See S 0300.
0300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0310 Australia, Radio: Australia Talks Back. See M 0310.
0315 Radio Taiwan International: Jade Bells and Bamboo Pipes. Carlton Wong plays Chinese folk and temple music.
0345 Radio Taiwan International: Let's Learn Chinese. See S 0345.

Wednesdays

0300 Australia, Radio: RA News. See S 0000.
0300 Radio Taiwan International: News. See S 0300.
0300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0310 Australia, Radio: Australia Talks Back. See M 0310.
0315 Radio Taiwan International: People. An introduction to people from all walks of life in Taiwan.
0330 Radio Taiwan International: Trends. Amanda with weekly sound bites about what's new and happening in Taipei.
0345 Radio Taiwan International: Let's Learn Chinese. See S 0345.

Thursdays

0300 Australia, Radio: RA News. See S 0000.
0300 Radio Taiwan International: News. See S 0300.
0300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0310 Australia, Radio: Australia Talks Back. See M 0310.
0315 Radio Taiwan International: Taiway Today. Focus on an aspect of Taiwanese life such as education or a point of interest.
0330 Radio Taiwan International: Miss Mook's Big Countdown. Miss Mook plays the latest releases of the popular music of Taiwan.
0345 Radio Taiwan International: Let's Learn Chinese. See S 0345.

Fridays

0300 Australia, Radio: RA News. See S 0000.
0300 Radio Taiwan International: News. See S 0300.
0300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0310 Australia, Radio: Australia Talks Back. See M 0310.
0315 Radio Taiwan International: Jade Bells and Bamboo Pipes. See T 0315.
0345 Radio Taiwan International: Let's Learn Chinese. See S 0345.

Saturdays

0300 Australia, Radio: RA News. See S 0000.
0300 Radio Taiwan International: News. See S 0300.
0300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0305 Australia, Radio: Book Reading. See F 2305.
0315 Radio Taiwan International: Taipei Magazine. A young couple's escapades in Taiwan.
0330 Australia, Radio: Rural Reporter. See W 2330.
0335 Radio Taiwan International: Life on the Outside. Discovering everyday life and customs in Taiwan.
0350 Radio Taiwan International: Let's Learn Chinese. See S 0345.

Frequencies

0400-0500	Anguilla,Caribbean Beacon	6090am			
0400-0500	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21725pa
0400-0500 vl	Australia, VL8K Katherine	5025do			
0400-0500 vl	Australia, VL8T Tent Crk	4910do			
0400-0500	Australia,DefenseForces R	14790as			
0400-0500	Canada, CBC N Quebec Svc	9625do			
0400-0500	Canada, CFRX Toronto	6070do			
0400-0500	Canada, CFVP Calgary	6030do			
0400-0500	Canada, CHNX Halifax	6130do			
0400-0500	Canada, CKZN St John's	6160do			
0400-0500	Canada, CKZU Vancouver	6160do			
0400-0429	Canada, R Canada Intl	9715me	11835me	11975me	
0400-0500	China, China Radio Intl	9560am	9730am		
0400-0500	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0400-0405	Croatia, Croatian Radio	9925na			
0400-0500	Cuba, Radio Havana	6000na	9820na	13605na	
0400-0500	Ecuador, HCJB	9745na	12015na	21455am	
0400-0450	Germany, Deutsche Welle	5990af	6015af	7225af	9565af
		11765af			
0400-0500	Germany,Overcomer Ministr	3975eu	11910as		
0400-0500 vl	Guatemala, Radio Cultural	3300do			
0400-0500	Ireland, Unt Christian BC	6200do			
0400-0500 as/vl	Italy, IRRS	7120va			
0400-0500	Kenya, Kenya Broadc Corp	4885do	4935do		
0400-0500 vl	Lesotho, Radio Lesotho	4800do			
0400-0410 vl/m-f	Malawi, MBC	5993do			
0400-0500	Malaysia, Radio	7295do			
0400-0500 vl	Malaysia, RTM Kuching	7160do			
0400-0430 mtwhfa	Mexico, Radio Mexico Intl	5985na	9705na		
0400-0425	Moldova, R Moldova Intl	7520na			
0400-0458	New Zealand, R NZ Intl	17675pa			
0400-0500 vl	Papua New Guinea, NBC	9675do			
0400-0500	Romania, R Romania Intl	9570na	11940na	15325as	17720as
0400-0500	Russia,Voice of Russia WS	9825na	12000na	12050na	13640na
		13790na	15425na	15455na	15595na
0400-0430	S Africa, Channel Africa	5955af			
0400-0500	Singapore,RCorp Singapore	6150do			
0400-0430	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0400-0430	Switzerland, Swiss R Intl	5840eu	9885am	9905am	
0400-0500 vl	Tanzania, Radio	5050do			
0400-0500	Turkey, Voice of	7270as	9655va	17705as	
0400-0415	Uganda, Radio	4976do			
0400-0500	UK, BBC African Service	3255af	6005af	6190af	7160af
		9600af	15420af		
0400-0500	UK, BBC Asian Service	9605as	11955as	15280as	15310as
		17790as	21660as		
0400-0430	UK, BBC World Service	3955eu	5975am	6175na	6180eu
		6195eu	9410eu	9895am	11760me
		12095eu	15575as	17640eu	
0400-0500	Ukraine, R Ukraine Intl	6020eu	6080eu	7410eu	9550na
		12040na	13590na		
0400-0500	USA, Armed Forces Network	4278am	6478am	12689am	
0400-0500	USA, KAIJ Dallas TX	5810am			
0400-0500	USA, KTBN Salt Lk City UT	7510am			
0400-0500	USA, KVOH Los Angeles CA	9975am			
0400-0500	USA, Voice of America	6080af	7170af	7265af	7275af
		7290af	9575af	9885af	11965me
		15205va			
0400-0500	USA, WBCQ Monticello ME	7415na			
0400-0500	USA, WEWN Birmingham AL	5825eu			
0400-0500 stwhfa	USA, WGTG McCaysville GA	5085am			
0400-0500	USA, WHRA Greenbush ME	9400me			
0400-0500	USA, WHRI Noblesville IN	5745am	7315am		
0400-0500	USA, WINB Red Lion PA	11950am			
0400-0500	USA, WJCR Upton KY	7490na	13595na		
0400-0500	USA, WMLK Bethel PA	9465am			
0400-0500 m	USA, WRMI/R Miami Intl	9955ca			
0400-0500 mw	USA, WSHB Cypress Crk SC	9840af			
0400-0500	USA, WWBS Macon GA	11905na			
0400-0500	USA, WWCR Nashville TN	3215am	5070am	5935am	7435am
0400-0500	USA, WYFR Okeechobee FL	6065na	9505na	9985va	
0400-0500	Zambia, Christian Voice	3330af	6065af		
0400-0500	Zambia, Natl BC Corp	6165do	6265do		
0400-0500 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0425-0440 vl	Italy, RAI Intl	5975af	7270af		
0425-0500	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0430-0500	Austria, R Austria Intl	6155eu	13730eu		
0430-0500	Netherlands, Radio	6165na	9590na		
0430-0500	Swaziland, Trans World R	3200af	4775af		
0430-0500	Switzerland, Swiss R Intl	9885na	9905na		
0430-0500	UK, BBC World Service	5975am	6175am	11760me	15575as
		17640me			
0430-0500 as	UK, BBC World Service	3955eu	6180eu	6195eu	9410eu
		12095eu			
0455-0500	Nigeria, Voice of	7255af	15120af		
0459-0500	New Zealand, R NZ Intl	11905pa			

Selected Programs

Sundays

0400 Australia, Radio: RA News. See S 0000.
0400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0405 Australia, Radio: Pacific Focus. Coverage of issues of relevance to people of the Pacific region.
0430 Australia, Radio: The Week's End. No information available for this new program.
0455 Malaysia, Voice of: Voice of Islam.
0455 Nigeria, Voice of: Anthem/Program Information. National anthem, program times and descriptions.

Mondays

0400 Australia, Radio: RA News. See S 0000.
0400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0410 Australia, Radio: The World Today (repeat). See M 0210.
0455 Malaysia, Voice of: Voice of Islam.
0455 Nigeria, Voice of: Anthem/Program Information. See S 0455.

Tuesdays

0400 Australia, Radio: RA News. See S 0000.
0400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0410 Australia, Radio: The World Today (repeat). See M 0210.
0430 Radio Mexico Intl: Music of Mexico. See S 0430.
0455 Malaysia, Voice of: Voice of Islam.
0455 Nigeria, Voice of: Anthem/Program Information. See S 0455.

Wednesdays

0400 Australia, Radio: RA News. See S 0000.
0400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0410 Australia, Radio: The World Today (repeat). See M 0210.
0455 Malaysia, Voice of: Voice of Islam.
0455 Nigeria, Voice of: Anthem/Program Information. See S 0455.

Thursdays

0400 Australia, Radio: RA News. See S 0000.
0400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0410 Australia, Radio: The World Today (repeat). See M 0210.
0455 Malaysia, Voice of: Voice of Islam.
0455 Nigeria, Voice of: Anthem/Program Information. See S 0455.

Fridays

0400 Australia, Radio: RA News. See S 0000.
0400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0410 Australia, Radio: The World Today (repeat). See M 0210.
0455 Malaysia, Voice of: Voice of Islam.
0455 Nigeria, Voice of: Anthem/Program Information. See S 0455.

Saturdays

0400 Australia, Radio: RA News. See S 0000.
0400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0405 Australia, Radio: Pacific Focus. See S 0405.
0430 Australia, Radio: Asia Pacific. See S 2310.
0455 Malaysia, Voice of: Voice of Islam.
0455 Nigeria, Voice of: Anthem/Program Information. See S 0455.

SWL Programs ..... *continued from page 40*

0709 HCJB (eu): "DX Partyline"
0830 WHRI (Angel 1/2 Indiana): "DXing with Cumbre"
0900 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
0910 HCJB (pac): "DX Partyline"
0940 FEBC (Philippines): "DX Dial"
1015 WWCR #3 (Tennessee): "Ask WWCR"
1030 Radio For Peace Intl: "Continent of Media"
1100 Radio For Peace Intl: "World of Radio"
1136 Voice of America (as pac): "Communications World (A)"
1247 Radio Bulgaria: "Radio Bulgaria Calling"
1305 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
1336 Voice of America (as pac): "Communications World (B)"
1342 Radio Tashkent: "Radio Tashkent DX Program"
1345 Voice of Turkey: "DX Corner" (biweekly)
1455 FEBC (Philippines): "DX Dial"
1530 WHRI (Angel 2 Indiana): "DXing with Cumbre"
1536 Voice of America (as pac/eu/af): "Communications World (C)"
1730 Radio For Peace Intl: "Continent of Media"
1736 Voice of America (af/as pac/eu/af): "Communications World (A)"
1800 Radio For Peace Intl: "World of Radio"
1830 WHRI (Angel 1 Indiana): "DXing with Cumbre"
1909 HCJB (eu): "DX Partyline"
1936 Voice of America (af/as pac/eu/af): "Communications World (C)"
1958 Vatican Radio: "On-the-Air"
2015 Voice of Turkey: "DX Corner" (biweekly)
2114 Radio Havana Cuba: "DXers Unlimited"
2130 WWCR #3 (Tennessee): "Ask WWCR"
2136 Voice of America (as pac/eu/af): "Communications World (B)"
2230 WHRA (Angel 5 Maine): "DXing with Cumbre"
2231 Radio Exterior de Espana: "Distance Unknown"
2243 Radio Bulgaria: "Radio Bulgaria Calling"
2300 KSDA (Guam): "Wavescan"
2300 Vatican Radio: "On-the-Air"
2323 Voice of Turkey: "DX Corner" (biweekly)
2330 WHRI (Angel 1 Indiana): "DXing with Cumbre"

Frequencies

0500-0600	Anguilla,Caribbean Beacon	6090am			
0500-0600	Australia, Radio	9660pa	12080as	15240pa	15510pa
		17715pa	21820pa		
0500-0600 vl	Australia, VL8K Katherine	5025do			
0500-0600 vl	Australia, VL8T Tent Crk	4910do			
0500-0600 vl	Cameroon, Radio Cameroon	4850do			
0500-0600	Canada, CBC N Quebec Svc	9625do			
0500-0600	Canada, CFRX Toronto	6070do			
0500-0600	Canada, CFVP Calgary	6030do			
0500-0600	Canada, CHNX Halifax	6130do			
0500-0600	Canada, CKZU Vancouver	6160do			
0500-0529 mtwhf	Canada, R Canada Intl	7295eu	9595eu	11835af	15430af
0500-0600	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0500-0505	Croatia, Croatian Radio	5945eu			
0500-0600	Cuba, Radio Havana	9550na	9820na	9830na	
0500-0600	Ecuador, HCJB	9745na	12015na	21455am	
0500-0550	Germany, Deutsche Welle	6045na	6185na	9615am	11810na
0500-0600	Germany,Overcomer Ministr	3975eu	11910as		
0500-0600	Ireland, Unt Christian BC	6200do			
0500-0515	Israel, Kol Israel	9435eu	11605eu	17535va	
0500-0600 as/vl	Italy, IRRS	7120va			
0500-0600	Japan, R Japan/NHK World	6110na	7230eu	9835na	11715as
		11760as	11840as	11850pa	15230pa
		17820me			
0500-0600	Kenya, Kenya Broadc Corp	4885do	4935do		
0500-0600 vl	Lesotho, Radio Lesotho	4800do			
0500-0600	Liberia, Star Radio	3400do			
0500-0600	Liberia,LCN/R Liberia Int	5100do			
0500-0510 vl/m-f	Malawi, MBC	5993do			
0500-0600	Malaysia, Radio	7295do			
0500-0600 vl	Malaysia, RTM Kuching	4895do	7160do		
0500-0530 mwhf	Mexico, Radio Mexico Intl	5985na	9705na		
0500-0600 vl	Namibia, NBC	3270af	3289af		
0500-0525	Netherlands, Radio	6165na	9590na		
0500-0600	New Zealand, R NZ Intl	11905pa			
0500-0505	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0500-0600	Nigeria, Voice of	7255af	15120af		
0500-0600	North Korea, R Pyongyang	3560as	11710eu	13790as	
0500-0600 vl	Papua New Guinea, NBC	9675do			
0500-0600	Russia,Voice of Russia WS	9825na	12000na	12050na	13645na
		13790na	15425na	15495na	15595na
0500-0530	S Africa, AWR Africa	6000af	6100af		
0500-0530	S Africa, Channel Africa	9525af			
0500-0600	Singapore,RCorp Singapore	6150do			
0500-0600	Spain, R Exterior Espana	6055am			
0500-0600 vl	Tanzania, Radio	5050do			
0500-0515	Uganda, Radio	4976do			
0500-0600	UK, BBC African Service	3255af	6005af	6190af	7160af
		9600af	15420af	17885af	
0500-0600	UK, BBC Asian Service	9740as	11955as	15280as	15310as
		15360as	17760as	17790as	21660as
0500-0600	UK, BBC World Service	3955eu	5975am	6175am	6180eu
		6195eu	9410eu	11760me	12095eu
		15575eu	17640me		
0500-0600	USA, Armed Forces Network	4278am	6458am	12689am	
0500-0600	USA, KAIJ Dallas TX	5810am			
0500-0600	USA, KTBN Salt Lk City UT	7510am			
0500-0600	USA, KVOH Los Angeles CA	9975am			
0500-0600	USA, Voice of America	5970af	6035af	6080af	7110as
		7170eu	7195af	9630af	11965me
		12080af	15205eu	15250as	
0500-0600	USA, WBCQ Monticello ME	7415na			
0500-0600	USA, WEWN Birmingham AL	5825eu			
0500-0600	USA, WHRA Greenbush ME	9400me			
0500-0600	USA, WHRI Noblesville IN	5745am	7315am		
0500-0600	USA, WINB Red Lion PA	11950am			
0500-0600	USA, WJCR Upton KY	7490na	13595na		
0500-0600	USA, WMLK Bethel PA	9465am			
0500-0600 mtwhfa	USA, WRMI/R Miami Intl	9955ca			
0500-0600 w	USA, WSHB Cypress Crk SC	7535eu	9835af		
0500-0600	USA, WWCR Nashville TN	2390am	3210am	5070am	5935na
0500-0600	USA, WYFR Okeechobee FL	5985na	9985eu	11580af	
0500-0530	Vatican State, Vatican R	4005eu	5883eu	7250eu	9660af
		11625af	15570af		
0500-0600	Zambia, Christian Voice	3330af	6065af		
0500-0600	Zambia, Natl BC Corp	6165do	6265do		
0500-0530 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0505-0600	Swaziland, Trans World R	3200af	4775af	9500af	
0525-0600	Ghana, Ghana Broadc Corp	3366do	4915do		
0530-0600	Austria, R Austria Intl	6015na			
0530-0600	Finland, YLE/R Finland	11945as	17830au		
0530-0600 a	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0530-0600	Serbia, Radio Yugoslavia	9580na	11870na		
0530-0600	Thailand, Radio	9655eu	11905eu	15445eu	
0530-0600	UAE, Radio Dubai	17830eu	21605eu		
0530-0600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0555-0600	Malaysia, Voice of	6175as	9750as	15295au	

Selected Programs

Sundays

0500 Australia, Radio: RA News. See S 0000.
0500 Israel, Kol Israel: News. World and regional news.
0500 Radio Mexico Intl: Universal Forum. Interview of a famous Mexican and discussion of his work.
0500 Nigeria, Voice of: Reflections. A thought-provoking talk on the real meaning of man and his existence.
0500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0505 Australia, Radio: Oz Sounds #1. Twenty minutes of music selections by Radio Australia announcers.
0505 Nigeria, Voice of: VoN Link-up. See S 0220.
0511 Israel, Kol Israel: Review of the Paper Press. A summary of items in the Israeli newspapers.
0530 Australia, Radio: Pacific Review. New program - no information available.
0530 Radio Mexico Intl: Music of Mexico. The traditional music of Mexico.
0530 Nigeria, Voice of: News. Thirty minutes of news, press review, sports, and interviews on the most current issues in Nigeria and elsewhere.
0546 Nigeria, Voice of: News about Nigeria. See S 0220.

Mondays

0500 Australia, Radio: RA News. See S 0000.
0500 Israel, Kol Israel: News. See S 0500.
0500 Nigeria, Voice of: Wave Train. A live music magazine which lightens up and informs listeners.
0500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0510 Australia, Radio: Pacific Beat. The magazine that provides a focus on the people and issues of the region.
0511 Israel, Kol Israel: Review of the Paper Press. See S 0511.
0530 Australia, Radio: Sport. Five or ten minutes of sports news.
0530 Nigeria, Voice of: VONSCOPE. See S 0530.
0540 Australia, Radio: Pacific Beat. See M 0510.

Tuesdays

0500 Australia, Radio: RA News. See S 0000.
0500 Israel, Kol Israel: News. See S 0500.
0500 Radio Mexico Intl: Antenna Radio Summary. A 15-minute magazine of news, finance, and culture.
0500 Nigeria, Voice of: Wave Train. See M 0500.
0500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0510 Australia, Radio: Pacific Beat. See M 0510.
0511 Israel, Kol Israel: Review of the Paper Press. See S 0511.
0530 Australia, Radio: Sport. See M 0530.
0530 Radio Mexico Intl: Music of Mexico. See S 0430.
0530 Nigeria, Voice of: VONSCOPE. See S 0530.
0540 Australia, Radio: Pacific Beat. See M 0510.

Wednesdays

0500 Australia, Radio: RA News. See S 0000.
0500 Israel, Kol Israel: News. See S 0500.
0500 Radio Mexico Intl: Antenna Radio Summary. See T 0400.
0500 Nigeria, Voice of: Wave Train. See M 0500.
0500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0510 Australia, Radio: Pacific Beat. See M 0510.
0511 Israel, Kol Israel: Review of the Paper Press. See S 0511.
0530 Australia, Radio: Sport. See M 0530.
0530 Radio Mexico Intl: Music of Mexico. See S 0430.
0530 Nigeria, Voice of: VONSCOPE. See S 0530.
0540 Australia, Radio: Pacific Beat. See M 0510.

Thursdays

0500 Australia, Radio: RA News. See S 0000.
0500 Israel, Kol Israel: News. See S 0500.
0500 Radio Mexico Intl: Antenna Radio Summary. See T 0400.
0500 Nigeria, Voice of: Wave Train. See M 0500.
0500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0510 Australia, Radio: Pacific Beat. See M 0510.
0511 Israel, Kol Israel: Review of the Paper Press. See S 0511.
0530 Australia, Radio: Sport. See M 0530.
0530 Radio Mexico Intl: Music of Mexico. See S 0430.
0530 Nigeria, Voice of: VONSCOPE. See S 0530.
0540 Australia, Radio: Pacific Beat. See M 0510.

Fridays

0500 Australia, Radio: RA News. See S 0000.
0500 Israel, Kol Israel: News. See S 0500.
0500 Radio Mexico Intl: Antenna Radio Summary. See T 0400.
0500 Nigeria, Voice of: Wave Train. See M 0500.
0500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0510 Australia, Radio: Pacific Beat. See M 0510.
0511 Israel, Kol Israel: Review of the Paper Press. See S 0511.
0530 Australia, Radio: Sport. See M 0530.
0530 Radio Mexico Intl: Music of Mexico. See S 0430.
0530 Nigeria, Voice of: VONSCOPE. See S 0530.
0540 Australia, Radio: Pacific Beat. See M 0510.

Saturdays

0500 Australia, Radio: RA News. See S 0000.
0500 Israel, Kol Israel: News. See S 0500.
0500 Radio Mexico Intl: Antenna Radio Summary. See T 0400.
0500 Nigeria, Voice of: African Safari. A musical journey around the countries of Africa with country profiles and current happenings.
0500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0505 Australia, Radio: Money, Markets, and the Economy.
0530 Australia, Radio: Earthbeat. See A 0230.
0530 Radio Mexico Intl: Music of Mexico. See S 0430.
0530 Nigeria, Voice of: News. See S 0530.

Frequencies

0600-0700	Anguilla,Caribbean Beacon	6090am			
0600-0700	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21725pa
0600-0700 vl	Australia, VL8K Katherine	5025do			
0600-0700 vl	Australia, VL8T Tent Crk	4910do			
0600-0700 vl	Canada, CBC N Quebec Svc	9625do			
0600-0700	Canada, CFRX Toronto	6070do			
0600-0700	Canada, CFVP Calgary	6030do			
0600-0700	Canada, CHNX Halifax	6130do			
0600-0700	Canada, CKZU Vancouver	6160do			
0600-0700	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0600-0605	Croatia, Croatian Radio	5945eu	9830eu	13830au	
0600-0700	Cuba, Radio Havana	9550na	9820na	9830na	
0600-0700	Ecuador, HCJB	9745na	12015na	21455am	
0600-0650	Germany, Deutsche Welle	11915af	13790af	15185af	17820as
		17860af	21680as		
0600-0700 vl	Germany, Sunrise Radio	5850va			
0600-0700	Germany,Overcomer Ministr	3975eu	13810au	15755as	
0600-0615	Ghana, Ghana Broadc Corp	3366do	4915do		
0600-0700	Ireland, Unt Christian BC	6200do			
0600-0700 vl	Italy, IRRS	3985va			
0600-0700	Japan, R Japan/NHK World	5975eu	7230eu	9835na	11740as
		11840as	11850pa	17810as	
0600-0700	Kenya, Kenya Broadc Corp	4885do	4935do		
0600-0700 vl	Lesotho, Radio Lesotho	4800do			
0600-0700	Liberia, Radio Veritas	5470do			
0600-0700	Liberia, Star Radio	3400do			
0600-0700	Liberia,LCN/R Liberia Int	5100do			
0600-0700	Malaysia, Radio	7295do			
0600-0700 vl	Malaysia, RTM Kuching	4895do	7160do		
0600-0625	Malaysia, Voice of	6175as	9750as	15295au	
0600-0700 vl	Namibia, NBC	3270af	3289af		
0600-0700	New Zealand, R NZ Intl	11905pa			
0600-0630	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0600-0700	Nigeria, Voice of	7255af	15120af		
0600-0700 vl	Papua New Guinea, NBC	9675do			
0600-0700	Romania, R Romania Intl	9510na	11940na		
0600-0700	Russia,Voice of Russia WS	9450au	17495au	17665au	21760au
		21790au			
0600-0630	S Africa, Channel Africa	11900af			
0600-0630	S Africa, Trans World R	11735af			
0600-0610	Sierra Leone, SLBS	3316do			
0600-0700	Singapore,RCorp Singapore	6150do			
0600-0700 vl	Solomon Islands, SIBC	5020do			
0600-0605	Swaziland, Trans World R	4775af	9500af		
0600-0700 vl	Tanzania, Radio	5050do			
0600-0700	UK, BBC African Service	6005af	6190af	7160af	9600af
		11835af	11940af	15420af	17885af
0600-0700	UK, BBC Asian Service	7145pa	9740as	11955pa	15310as
		15360as	17760as	17790as	21660as
0600-0700	UK, BBC World Service	5975am	6175am	6180eu	6195eu
		7325eu	9410eu	11760me	12095eu
		15565eu	15575eu	17640me	
0600-0700	USA, Armed Forces Network	4278am	6458am	12689am	
0600-0700	USA, KAIJ Dallas TX	5810am			
0600-0700	USA, KTBN Salt Lk City UT	7510am			
0600-0700	USA, KVOH Los Angeles CA	9975ca			
0600-0630	USA, Voice of America	5970af	6035af	6080af	7170eu
		7195af	9630af	9680af	11805af
		11965me	11995af	12080af	15205va
0600-0700	USA, WEWN Birmingham AL	5825eu			
0600-0700	USA, WHRA Greenbush ME	11565af			
0600-0700	USA, WHRI Noblesville IN	5745am	7315am		
0600-0700	USA, WINB Red Lion PA	11950am			
0600-0700	USA, WJCR Upton KY	7490na	13595na		
0600-0700	USA, WMLK Bethel PA	9465am			
0600-0700 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0600-0700 tf	USA, WSHB Cypress Crk SC	7535eu			
0600-0700	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0600-0700	USA, WYFR Okeechobee FL	5985am	7355va		
0600-0700	Yemen, Radio Aden	9780do			
0600-0700	Zambia, Christian Voice	3330af	6065af		
0600-0700	Zambia, Natl BC Corp	6165do	6265do		
0600-0700 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0605-0700	Swaziland, Trans World R	4775af	6100af	9500af	
0630-0700	Switzerland, Swiss R Intl	5840eu			
0630-0700	USA, Voice of America	7170eu	11805af	11965me	15205eu
0630-0700 as	USA, Voice of America	5970af	6035af	6080af	7195af
		9630af	11995af	12080af	
0630-0645 mtwhfa	Vatican State, Vatican R	4005eu	5883eu	7250eu	9645eu
		11740eu	15595eu		
0641-0656	Romania, R Romania Intl	9550eu	9625eu	9665eu	11885eu
0645-0655 s	Albania, TWR Tirana	9685eu			
0645-0700	Vatican State, Vatican R	11625af	13765af	15570af	
0655-0700	Albania, TWR Tirana	9685eu			

Selected Programs

Sundays

0600 Australia, Radio: RA News. See S 0000.
0600 Nigeria, Voice of: This Week on VON. Highlights of programs for the coming week.
0600 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0605 Australia, Radio: Ockham's Razor. Robyn Williams with straight, sharp talk about science.
0615 Nigeria, Voice of: Listeners' Letters. Typical mailbag program with info for pen pals.
0630 Australia, Radio: Correspondents' Report. See S 0030.
0630 Nigeria, Voice of: Weekly Analysis. An examination of three issues of interest each week.

Mondays

0600 Australia, Radio: RA News. See S 0000.
0600 Nigeria, Voice of: Across the Ages. An examination of the evolution of Nigeria's cultural practices.
0600 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0610 Australia, Radio: The Australian Music Show. Kim Taylor presents the music, people, and issues of the Australian contemporary music industry.
0615 Nigeria, Voice of: Nigeria and Politics. Happenings on the Nigerian political scene.
0630 Australia, Radio: Sports. A half-hour of sports.
0630 Nigeria, Voice of: World News. Ten minutes of international news.
0655 Nigeria, Voice of: Program Announcements. See S 0220.

Tuesdays

0600 Australia, Radio: RA News. See S 0000.
0600 Nigeria, Voice of: Agenda for Peace. Focus on reconcilation among the races in the region.
0600 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0610 Australia, Radio: The Australian Music Show. See M 0610.
0615 Nigeria, Voice of: Nigeria Scene. See S 0220.
0630 Australia, Radio: Sports. See M 0630.
0630 Nigeria, Voice of: World News. See M 0630.
0640 Nigeria, Voice of: Commentary. Opinion on events in Nigeria.
0645 Nigeria, Voice of: News about Nigeria. See S 0220.
0655 Nigeria, Voice of: Program Announcements. See S 0220.

Wednesdays

0600 Australia, Radio: RA News. See S 0000.
0600 Nigeria, Voice of: Nigerian Newsletter. A personal review of interesting Nigerian events with opinions on contemporary issues.
0600 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0610 Australia, Radio: At Your Request. Dick Paterson plays favorite music.
0615 Nigeria, Voice of: Wheel of Progress. Industrial and agricultural development in Nigeria.
0630 Australia, Radio: Sports. See M 0630.
0630 Nigeria, Voice of: World News. See M 0630.
0640 Nigeria, Voice of: Commentary. See T 0640.
0645 Nigeria, Voice of: News about Nigeria. See S 0220.
0655 Nigeria, Voice of: Program Announcements. See S 0220.

Thursdays

0600 Australia, Radio: RA News. See S 0000.
0600 Nigeria, Voice of: West African Scene. A news magazine which reflects the events in the sub-region.
0600 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0610 Australia, Radio: Blacktracker. Mal Honess with an insight into the music and performance of Australia's aborigines.
0615 Nigeria, Voice of: World of the Arts. See S 0220.
0630 Australia, Radio: Sports. See M 0630.
0630 Nigeria, Voice of: World News. See M 0630.
0640 Nigeria, Voice of: Commentary. See T 0640.
0645 Nigeria, Voice of: News about Nigeria. See S 0220.
0655 Nigeria, Voice of: Program Announcements. See S 0220.

Fridays

0600 Australia, Radio: RA News. See S 0000.
0600 Nigeria, Voice of: African Writers. See M 1630.
0600 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0610 Australia, Radio: Australian Country Style. Graham Bell goes up country.
0615 Nigeria, Voice of: Images of Nigeria. See S 1645.
0630 Australia, Radio: Sports. See M 0630.
0630 Nigeria, Voice of: World News. See M 0630.
0640 Nigeria, Voice of: Commentary. See T 0640.
0645 Nigeria, Voice of: News about Nigeria. See S 0220.
0655 Nigeria, Voice of: Program Announcements. See S 0220.

Saturdays

0600 Australia, Radio: RA News. See S 0000.
0600 Nigeria, Voice of: From the Racks. See S 0220.
0600 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
0605 Australia, Radio: Feedback. See S 0305.
0615 Nigeria, Voice of: Issues of the Moment. See F 1645.
0630 Australia, Radio: Arts Australia. See T 2330.
0630 Nigeria, Voice of: Weekly Analysis. See S 0630.

FREQUENCIES

0700-0800	Anguilla,Caribbean Beacon	6090am			
0700-0800	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21725pa
0700-0800 vl	Australia, VL8K Katherine	5025do			
0700-0800 vl	Australia, VL8T Tent Crk	4910do			
0700-0800	Canada, CFRX Toronto	6070do			
0700-0800	Canada, CFVP Calgary	6030do			
0700-0800	Canada, CHNX Halifax	6130do			
0700-0800	Canada, CKZU Vancouver	6160do			
0700-0800	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0700-0710 mtwhfa	Croatia, Croatian Radio	5945eu	9830eu	13820au	
0700-0727	Czech Rep, Radio Prague	7345eu	9505eu		
0700-0800	Ecuador, HCJB	9640pa	11960eu		
0700-0800 as	Eqt Guinea, R East Africa	15186af			
0700-0800 mtwhf	Eqt Guinea, Radio Africa	15186af			
0700-0800 vl	Germany, Sunrise Radio	5850va			
0700-0800 s	Germany,Good News World R	13740eu			
0700-0800	Germany,Overcomer Ministr	13810au	15755as		
0700-0715	Ghana, Ghana Broadc Corp	3366do	4915do		
0700-0800	Guyana, GBC/Voice of	3290do	5950do		
0700-0800	Ireland, Unt Christian BC	6200do			
0700-0730 vl	Italy, IRRS	3985va			
0700-0800	Kenya, Kenya Broadc Corp	4885do	4935do		
0700-0800 vl	Lesotho, Radio Lesotho	4800do			
0700-0800	Liberia, Radio Veritas	5470do			
0700-0800	Liberia, Star Radio	3400do			
0700-0715	Liberia,LCN/R Liberia Int	5100do			
0700-0800	Malaysia, Radio	7295do			
0700-0800	Myanmar, Radio	9730do			
0700-0715 vl	Namibia, NBC	3270af	3289af		
0700-0705	New Zealand, R NZ Intl	11905pa			
0700-0800 vl	Papua New Guinea, NBC	9675do			
0700-0800	Romania, R Romania Intl	17735af	21480af		
0700-0800	Russia,Voice of Russia WS	9450au	15490au	17495au	17665au
		21760au	21790au		
0700-0710	Sierra Leone, SLBS	3316do			
0700-0800	Singapore,RCorp Singapore	6150do			
0700-0730	Slovakia, R Slovakia Intl	9440eu	15460au	17550au	
0700-0800 vl	Solomon Islands, SIBC	5020do			
0700-0735	Swaziland, Trans World R	4775af	6100af	9500af	
0700-0800	Taiwan, Radio Taipei Intl	5950na			
0700-0800 vl	Tanzania, Radio	5050do			
0700-0730	UK, BBC African Service	6005af	6190af	9600af	11835af
		11940af	17830af		
0700-0800 as	UK, BBC African Service	17885af			
0700-0800	UK, BBC Asian Service	7145pa	9740as	11955pa	15310as
		15360as	17760as	17790as	21660as
0700-0800	UK, BBC World Service	5975am	6175am	6195eu	7325eu
		9410eu	11760me	12095eu	15485eu
		15565eu	15575eu	17640me	
0700-0800	USA, Armed Forces Network	4278am	6458am	12689am	
0700-0800	USA, KAIJ Dallas TX	5810am			
0700-0800	USA, KTBN Salt Lk City UT	7510am			
0700-0800	USA, KWHR Naalehu HI	11565as			
0700-0800	USA, WEWN Birmingham AL	5825eu			
0700-0800	USA, WHRA Greenbush ME	11565af			
0700-0800	USA, WHRI Noblesville IN	5745am			
0700-0800	USA, WJCR Upton KY	7490na	13595na		
0700-0800	USA, WMLK Bethel PA	9465am			
0700-0800 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0700-0800	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0700-0800	USA, WYFR Okeechobee FL	7355eu	9985af	13695va	
0700-0715 vl	Vanuatu, Radio	3945do	4960do		
0700-0800	Zambia, Christian Voice	6065af			
0700-0800	Zambia, Natl BC Corp	6165do	6265do		
0700-0800 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0706-0800	New Zealand, R NZ Intl	9700pa			
0715-0730 s	Greece, Voice of	9375eu	9425au	9755au	11645eu
		15650au			
0715-0800 vl	Namibia, NBC	4930af	4965af		
0730-0800	Austria, R Austria Intl	6155eu	13730eu	15410me	17870me
0730-0740 s	Greece, Voice of	9375eu	9425eu	9755au	11645eu
		15650au			
0730-0800 smtwha	Malta, VO Mediterranean	9600eu			
0730-0800	Netherlands, Radio	9720pa	9820pa		
0730-0800	Switzerland, Swiss R Intl	9885af	11860af	13635af	
0730-0800	UK, BBC African Service	6190af	9600af	11940af	15400af
		17830af			
0730-0800 as	UK, BBC World Service	15575eu			
0730-0745	Vatican State, Vatican R	11625af	13765af	15570af	
0735-0800 as	Swaziland, Trans World R	4775af	6100af	9500af	
0740-0800	Guam, TWR/KTWR	15200as			
0745-0800 s	Ghana, Ghana Broadc Corp	3366do	4915do		
0745-0755 as	Monaco, Trans World Radio	9755eu			
0755-0800 mtwhf	Monaco, Trans World Radio	9755eu			
0800-0820	Albania, TWR Tirana	9685eu			
0800-0900	Anguilla,Caribbean Beacon	6090am			
0800-0900	Australia, Radio	5995pa	9580pa	9580pa	9710pa
		12080as	15415as	15510pa	17715pa
		17750as	21725pa		
0800-0830 vl	Australia, VL8K Katherine	5025do			
0800-0830 vl	Australia, VL8T Tent Crk	4910do			
0800-0900 vl	Canada, CBC N Quebec Svc	9625do			
0800-0900	Canada, CFRX Toronto	6070do			
0800-0900	Canada, CFVP Calgary	6030do			
0800-0900	Canada, CHNX Halifax	6130do			
0800-0900	Canada, CKZU Vancouver	6160do			
0800-0900	Costa Rica,RF Peace Intl	15050am	21460am		
0800-0900	Ecuador, HCJB	9640pa	11960eu		
0800-0900 as	Eqt Guinea, R East Africa	15186af			
0800-0900 mtwhf	Eqt Guinea, Radio Africa	15186af			
0800-0900 vl	Germany, Sunrise Radio	5850va			
0800-0830 s	Germany, Universal Life	17780as			
0800-0900	Germany,Overcomer Ministr	13810au	15755as		
0800-0805 s	Ghana, Ghana Broadc Corp	3366do			
0800-0900	Guam, TWR/KTWR	15200as			
0800-0900	Guyana, GBC/Voice of	3290do	5950do		
0800-0900	Indonesia, Voice of	9525as	11765as	15510as	
0800-0900	Ireland, Unt Christian BC	6200do			
0800-0900	Kenya, Kenya Broadc Corp	4885do	4935do		
0800-0900	Liberia, Radio Veritas	5470do			
0800-0900	Liberia,LCN/R Liberia Int	5100do			
0800-0900	Malaysia, Radio	7295do			
0800-0900	Monaco, Trans World Radio	9755eu			
0800-0830	Myanmar, Radio	9730do			
0800-0900 vl	Namibia, NBC	4930af	4965af		
0800-0900	Netherlands, Radio	9720pa	9820pa		
0800-0900	New Zealand, R NZ Intl	9700pa			
0800-0900 as	Palau, KHBN/Voice of Hope	9985as			
0800-0900 vl	Papua New Guinea, NBC	9675do			
0800-0900	Russia,Voice of Russia WS	9450au	17495au	17665au	21760au
		21790au			
0800-0810	Sierra Leone, SLBS	3316do			
0800-0900	Singapore,RCorp Singapore	6150do			
0800-0900 vl	Solomon Islands, SIBC	5020do			
0800-0900	South Korea, R Korea Intl	9570au	13670eu		
0800-0805 as	Swaziland, Trans World R	4775af	6100af	9500af	
0800-0900 vl	Tanzania, Radio	5050do			
0800-0900	UK, BBC African Service	6190af	11940af	15400af	17830af
0800-0900 as	UK, BBC African Service	17885af			
0800-0900	UK, BBC Asian Service	7145pa	9740as	11955pa	15310as
		15360as	17760as	17790as	21660as
0800-0900	UK, BBC World Service	7325eu	9410eu	12095eu	15485eu
		15565eu	17640eu		
0800-0900 as	UK, BBC World Service	15575as			
0800-0900	USA, Armed Forces Network	4278am	6458am	12689am	
0800-0900	USA, KAIJ Dallas TX	5810am			
0800-0900	USA, KNLS Anchor Point AK	7365as			
0800-0900	USA, KTBN Salt Lk City UT	7510am			
0800-0900	USA, KWHR Naalehu HI	11565as			
0800-0900	USA, WEWN Birmingham AL	5825eu			
0800-0900	USA, WHRA Greenbush ME	11565af			
0800-0900	USA, WHRI Noblesville IN	5745am	7315am		
0800-0900	USA, WJCR Upton KY	7490na	13595na		
0800-0900	USA, WMLK Bethel PA	9465am			
0800-0900 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0800-0900 as	USA, WSHB Cypress Crk SC	9835eu			
0800-0900 twhas	USA, WSHB Cypress Crk SC	9845pa			
0800-0900	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0800-0815 vl	Vanuatu, Radio	3945do	4960do		
0800-0900	Zambia, Christian Voice	6065af			
0800-0900	Zambia, Natl BC Corp	6165do	6265do		
0800-0900 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0805-0810 s	Croatia, Croatian Radio	5945eu	9830eu	13820au	
0805-0810	Pakistan, Radio	15530eu	17835eu		
0815-0900 mtwtf	Nigeria, FRCN/Radio	3326do	4770do	4990do	
0815-0900 f	Seychelles, FEBA Radio	15540as			
0820-0835 as	Albania, TWR Tirana	9685eu			
0830-0900 vl	Australia, VL8A Alice Spg	2310do			
0830-0900 vl	Australia, VL8K Katherine	2485do			
0830-0900 vl	Australia, VL8T Tent Crk	2325do			
0830-0855	Belgium, R Vlaanderen Int	7290eu	9940au		
0830-0900	Switzerland, Swiss R Intl	9885au	13685au		
0835-0850 s	Albania, TWR Tirana	9685eu			
0855-0900	Guam, TWR/KTWR	15330pa			

FREQUENCIES

0900-1000	Anguilla,Caribbean Beacon	6090am			
0900-1000	Australia, Radio	6080as	9580pa	11880as	17750as
0900-1000 vl	Australia, VL8A Alice Spg	2310do			
0900-1000 vl	Australia, VL8K Katherine	2485do			
0900-1000 vl	Australia, VL8T Tent Crk	2325do			
0900-1000	Bhutan, Bhutan BC Service	5030do			
0900-1000	Canada, CFRX Toronto	6070do			
0900-1000	Canada, CFVP Calgary	6030do			
0900-1000	Canada, CHNX Halifax	6130do			
0900-1000	Canada, CKZU Vancouver	6160do			
0900-1000	China, China Radio Intl	9785pa	9890pa	11755pa	
0900-1000	Costa Rica,RF Peace Intl	15050am	21460am		
0900-0910 mtwhfa	Croatia, Croatian Radio	7185eu	9830eu	13820au	
0900-0927	Czech Rep, Radio Prague	17485af	21745as		
0900-1000	Ecuador, HCJB	9640pa	21455am		
0900-1000 as	Eqt Guinea, R East Africa	15186af			
0900-1000 mtwhf	Eqt Guinea, Radio Africa	15186af			
0900-0950	Germany, Deutsche Welle	6160pa	9565af	12055as	15205af
		15410af	17715as	17800af	21600af
		21680as			
0900-1000	Germany, Sunrise Radio	5850va			
0900-1000 a	Germany,Good News World R	5910eu			
0900-1000	Germany,Overcomer Ministr	13810au	15735as		
0900-0915 mtwtf	Ghana, Ghana Broadc Corp	3366do	4915do		
0900-0915	Guam, TWR/KTWR	15200as			
0900-0930	Guyana, GBC/Voice of	3290do	5950do		
0900-1000	Ireland, Unt Christian BC	6200do			
0900-1000	Kenya, Kenya Broadc Corp	4935do			
0900-1000	Liberia, Radio Veritas	5470do			
0900-0915	Liberia,LCN/R Liberia Int	5100do			
0900-1000	Malaysia, Radio	7295do			
0900-1000 vl	Malaysia, RTM Kuching	4895do	7160do		
0900-0930 s	Malta, VO Mediterranean	9600eu			
0900-1000 s	Malta, VO Mediterranean	9600eu			
0900-0935 a	Monaco, Trans World Radio	9755eu			
0900-0920 s	Monaco, Trans World Radio	9755eu			
0900-1000 twhfas	N Mariana Is, KHBI Saipan	15665as			
0900-1000 vl	Namibia, NBC	4930af	4965af		
0900-0925	Netherlands, Radio	9720pa	9820pa		
0900-1000	New Zealand, R NZ Intl	9700pa			
0900-1000 vl	Papua New Guinea, NBC	4890do			
0900-1000	Russia,Voice of Russia WS	9450au	17495au	17665au	21760au
		21790au			
0900-1000	Singapore,RCorp Singapore	6150do			
0900-1000 vl	Solomon Islands, SIBC	5020do			
0900-1000 vl	Tanzania, Radio	5050do			
0900-1000	UK, BBC African Service	6190af	11940af	15400af	17830af
		17885af			
0900-0915	UK, BBC Asian Service	6065as	6195as	9580as	9740as
		11765as	11955as	15310as	15360as
		17760as	17790as	21660as	
0900-1000	UK, BBC World Service	9410eu	11760me	12095eu	15190sa
		15485eu	15565eu	15575eu	17640eu
		17705eu			
0900-1000	USA, Armed Forces Network	4278am	6458am	12689am	
0900-1000	USA, KAIJ Dallas TX	5810am			
0900-1000	USA, KTBN Salt Lk City UT	7510am			
0900-1000	USA, KWHR Naalehu HI	11565pa			
0900-1000	USA, WEWN Birmingham AL	5825eu			
0900-1000	USA, WHRI Noblesville IN	5745am	7315am		
0900-1000	USA, WJCR Upton KY	7490na	13595na		
0900-1000 mtwhf	USA, WRMI/R Miami Intl	9955ca			
0900-1000 th	USA, WSHB Cypress Crk SC	9835eu			
0900-1000	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0900-1000	Zambia, Christian Voice	6065af			
0900-1000	Zambia, Natl BC Corp	6165do	6265do		
0900-1000 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0915-1000	Ghana, Ghana Broadc Corp	6130do	7295do		
0915-0945	UK, BBC Asian Service	15310as	17790as		
0915-0945 as	UK, BBC Asian Service	6195as	9740as	11765as	15360as
		21660as			
0920-0930 t	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0930-1000 mtwhfa	Austria, R Austria Intl	15455as	17870au		
0930-1000	Canada, CKZN St John's	6160do			
0930-1000	Georgia, Radio	11910eu			
0930-1000	Guam, TWR/KTWR	9865as			
0930-1000	Italy, AWR Europe	7230eu			
0930-1000	Netherlands, Radio	12065as	13710as		
0930-1000	Philippines, FEBC/R Intl	11635as			
0935-0950 s	Monaco, Trans World Radio	9755eu			
0945-1000	UK, BBC Asian Service	6195as	9740as	11765as	15360as
		17760as	17790as	21660as	
0945-1000 a	UK, BBC Asian Service	6065as	9580as	11945as	11955as
		15280as			
0945-1000 smtwhf	UK, BBC Slow Speed News	6065as	9580as	11945as	11955as
		15280as			
1000-1100	Anguilla,Caribbean Beacon	6090am			
1000-1100	Australia, Radio	6080as	9580pa	11880as	17750as
1000-1100 vl	Australia, VL8A Alice Spg	2310do			
1000-1100 vl	Australia, VL8K Katherine	2485do			
1000-1100 vl	Australia, VL8T Tent Crk	2325do			
1000-1100 vl	Canada, CBC N Quebec Svc	9625do			
1000-1100	Canada, CFRX Toronto	6070do			
1000-1100	Canada, CFVP Calgary	6030do			
1000-1100	Canada, CHNX Halifax	6130do			
1000-1100	Canada, CKZN St John's	6160do			
1000-1100	Canada, CKZU Vancouver	6160do			
1000-1100	China, China Radio Intl	9785pa	9890pa	11755pa	
1000-1100	Costa Rica,RF Peace Intl	15050am	21460am		
1000-1100	Ecuador, HCJB	9640pa	21455am		
1000-1100 as	Eqt Guinea, R East Africa	15186af			
1000-1100 mtwhf	Eqt Guinea, Radio Africa	15186af			
1000-1100	Germany, Sunrise Radio	5850va			
1000-1100	Germany,Overcomer Ministr	15715au	15755as	17505pa	
1000-1100 as	Germany,Overcomer Ministr	5900eu			
1000-1030	Guam, AWR/KSDA	11790as			
1000-1100	Guam, TWR/KTWR	9865as			
1000-1100	India, All India Radio	11585as	13700va	15040va	17387pa
		17840as			
1000-1100	Ireland, Unt Christian BC	6200do			
1000-1100	Japan, R Japan/NHK World	9695as	11730as	11850pa	
1000-1100	Kenya, Kenya Broadc Corp	4935do			
1000-1100	Malaysia, Radio	7295do			
1000-1100 irreg	Malaysia,RTM KotaKinabalu	5980do			
1000-1030 s	Malta, VO Mediterranean	9600eu			
1000-1100 twhfas	N Mariana Is, KHBI Saipan	11660pa	15665as		
1000-1100 vl	Namibia, NBC	4930af	4965af		
1000-1030	Netherlands, Radio	12065as	13710as		
1000-1015	New Zealand, R NZ Intl	9700pa			
1000-1100	Nigeria, Voice of	7255af	15120af		
1000-1100 vl	Papua New Guinea, NBC	4890do			
1000-1100	Philippines, FEBC/R Intl	11635as			
1000-1030	Singapore, RTE Radio	11740as			
1000-1100	Singapore,RCorp Singapore	6150do			
1000-1100 vl	Solomon Islands, SIBC	5020do			
1000-1100 vl	Tanzania, Radio	5050do			
1000-1100	UK, BBC African Service	6190af	11940af	17885af	
1000-1100 as	UK, BBC African Service	15400af	17830af		
1000-1030	UK, BBC Asian Service	6195as	9740as	11765as	15310as
		15360as	17790as	21660as	
1000-1100	UK, BBC World Service	6195am	9410eu	11760me	12095eu
		15485eu	15565eu	15575eu	17640eu
		17705eu			
1000-1100 as	UK, BBC World Service	15190sa			
1000-1100	USA, Armed Forces Network	4278am	6458am	12689am	
1000-1100	USA, KAIJ Dallas TX	5810am			
1000-1100	USA, KTBN Salt Lk City UT	7510am			
1000-1100	USA, KWHR Naalehu HI	11565pa			
1000-1100	USA, Voice of America	5985pa	6165ca	7405ca	9590ca
		11720as	15425as		
1000-1100	USA, WEWN Birmingham AL	5825eu			
1000-1100	USA, WHRI Noblesville IN	6040am	9495am		
1000-1100	USA, WJCR Upton KY	7490na	13595na		
1000-1100 mtwhf	USA, WRMI/R Miami Intl	9955ca			
1000-1100 wh	USA, WSHB Cypress Crk SC	6095na			
1000-1100 a	USA, WSHB Cypress Crk SC	9455sa			
1000-1100	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
1000-1100 mtwhfa	USA, WYFR Okeechobee FL	5950na			
1000-1030	Vietnam, Voice of	9840as	12020as	15010as	
1000-1100	Zambia, Christian Voice	6065af			
1000-1100	Zambia, Natl BC Corp	6165do	6265do		
1000-1100 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1005-1010 s	Croatia, Croatian Radio	7185eu	9830eu		
1030-1100 s	Austria, R Austria Intl	15455as	17870au		
1030-1057	Czech Rep, Radio Prague	7345eu	11640eu		
1030-1100	Georgia, Radio	11910eu			
1030-1100	Guam, AWR/KSDA	11790as	15170as		
1030-1100	Lithuania, Radio Vilnius	9710eu			
1030-1100	Netherlands, Radio	6045eu	9860eu	12065as	13710as
1030-1100	South Korea, R Korea Intl	11715am			
1030-1100	Sri Lanka, Sri Lanka BC	11835as	17850as		
1030-1100	UAE, Radio Dubai	13675eu	15370eu	15395eu	21605eu
1030-1100	UK, BBC Asian Service	6195as	9740as	11765pa	15310as
		17790as			

Your Name in Lights!

... or at least in ink within the *Monitoring Times* Shortwave Guide. Please send us your "best catches" on the worldwide shortwave bands — QSLs, that is — and we will try to use them in future issues of *MT*. Your QSLs will be returned.

Frequencies

1100-1200	Anguilla,Caribbean Beacon	11775am			
1100-1200	Australia, Radio	6080as	9580pa		
1100-1200 vl	Australia, VL8A Alice Spg	2310do			
1100-1200 vl	Australia, VL8K Katherine	2485do			
1100-1200 vl	Australia, VL8T Tent Crk	2325do			
1100-1200	Canada, CFRX Toronto	6070do			
1100-1200	Canada, CFVP Calgary	6030do			
1100-1200	Canada, CHNX Halifax	6130do			
1100-1200	Canada, CKZN St John's	6160do			
1100-1200	Canada, CKZU Vancouver	6160do			
1100-1200	Costa Rica,RF Peace Intl	15050am	21460am		
1100-1200	Ecuador, HCJB	12005am	15115am	21455am	
1100-1200 as	Eqt Guinea, R East Africa	15186af			
1100-1200	Eqt Guinea, Radio Africa	9530as			
1100-1150	Germany, Deutsche Welle	15370af	15410af	17765af	17800af
1100-1200	Germany, Sunrise Radio	5850va			
1100-1200 as	Germany,Overcomer Ministr	5900eu			
1100-1200	Germany,Overcomer Ministr	15375as	15715au	17505pa	
1100-1200	Iran, VOIRI	11830as	11875as	13605me	15260as
1100-1200	Ireland, Unt Christian BC	6200do			
1100-1200	Japan, R Japan/NHK World	6120na	9695as	11730as	
1100-1200	Jordan, Radio	11690eu			
1100-1200	Kenya, Kenya Broadc Corp	4935do			
1100-1110 fa	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
1100-1110	Liberia,LCN/R Liberia Int	5100do			
1100-1200	Malaysia, Radio	7295do			
1100-1200 irreg	Malaysia,RTM KotaKinabalu	5980do			
1100-1200 twhfas	N Mariana Is, KHBI Saipan	9355as			
1100-1200 vl	Namibia, NBC	4930af	4965af		
1100-1125	Netherlands, Radio	6045eu	9860eu	12065as	13710as
1100-1200	North Korea, R Pyongyang	3560as	9975me	11335am	13650va
		15230as			
1100-1120	Pakistan, Radio	15534eu	17835eu		
1100-1130 as	Palau, KHBN/Voice of Hope	9965as			
1100-1200 vl	Papua New Guinea, NBC	4890do			
1100-1200	Singapore,R Singapore Int	6015as	6150as		
1100-1130 vl	Solomon Islands, SIBC	5020do			
1100-1200	South Korea, R Korea Intl	7275as			
1100-1130	Sri Lanka, Sri Lanka BC	11835as	17850as		
1100-1200	Switzerland, Swiss R Intl	9810as	17515as		
1100-1130	Switzerland, Swiss R Intl	9535eu			
1100-1200	Taiwan, Radio Taipei Intl	7445as			
1100-1200	Taiwan, Voice of Asia	7445as			
1100-1200 vl	Tanzania, Radio	5050do			
1100-1200	UK, BBC African Service	6190af	11940af	15400af	17830af
		17885af	21660af		
1100-1200	UK, BBC Asian Service	6195as	9580as	9740as	11955as
		15280as	15310as	17785as	
1100-1130 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1100-1130	UK, BBC World Service	5965na	9410eu	11760me	12095eu
		15485eu	15565eu	15575eu	17640eu
		17705eu	17790sa		
1100-1130 as	UK, BBC World Service	6195am	15190sa	15220am	
1100-1200	USA, Armed Forces Network	4278am	6458am	12689am	
1100-1200	USA, KAIJ Dallas TX	5810am			
1100-1200	USA, KTBN Salt Lk City UT	7510am			
1100-1200	USA, KWHR Naalehu HI	11565pa			
1100-1200	USA, Voice of America	5985pa	6160as	9645as	9760as
		11720as	15160as	15425as	
1100-1200	USA, WEWN Birmingham AL	9465na	15745eu		
1100-1200 mtwhfa	USA, WGTG McCaysville GA	9400am			
1100-1200	USA, WHRI Noblesville IN	6040am	9495am		
1100-1200	USA, WJCR Upton KY	7490na	13595na		
1100-1200 mtwhfa	USA, WRMI/R Miami Intl	9955ca			
1100-1200 tfas	USA, WSHB Cypress Crk SC	6095na			
1100-1200 wf	USA, WSHB Cypress Crk SC	9455ca			
1100-1200	USA, WWCR Nashville TN	2390am	5070am	5935am	
1100-1200 mtwhf	USA, WWCR Nashville TN	3210am			
1100-1200 as	USA, WWCR Nashville TN	15685am			
1100-1200 mtwhfa	USA, WYFR Okeechobee FL	5950na			
1100-1200	USA, WYFR Okeechobee FL	5850na			
1100-1130	Vietnam, Voice of	7285as	9730as		
1100-1200	Zambia, Christian Voice	6065af			
1100-1200	Zambia, Natl BC Corp	6165do	6265do		
1100-1200 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1125-1200	Netherlands, Radio	6045eu	9860eu		
1130-1155	Belgium, R Vlaanderen Int	9925eu	15595eu		
1130-1200 vl	China, China Radio Intl	8660as	11700as		
1130-1135	Israel, Kol Israel	15640eu	15650va		
1130-1200	Sweden, Radio	15235am	15240am	17870am	
1130-1200 as	UK, BBC Asian Service	15310as	17785as		
1130-1200	UK, BBC World Service	6195am	15220am		
1130-1200	USA, Voice of America	11680eu			
1130-1200 f	Vatican State, Vatican R	15595va	17550va		
1130-1145	Vatican State, Vatican R	5883eu	9645eu	11740eu	15595va

Selected Programs

Sundays

1100 Australia, Radio: RA News. See S 0000.
1100 Singapore, R Singapore Intl: News. Singapore, regional and international news.
1105 Australia, Radio: Jazz Notes. The best of Australian jazz is introduced by Ivan Lloyd.
1105 Singapore, R Singapore Intl: Reflections. Musings on life in Singapore and the region as seen through the eyes of writers, poets, and commentators.
1115 Singapore, R Singapore Intl: Business World. A magazine program which analyzes the latest business and financial trends in Singapore and the rest of Asia.
1130 Australia, Radio: Money, Markets, and the Economy.
1130 Singapore, R Singapore Intl: News. See S 1100.
1135 Singapore, R Singapore Intl: Frontiers. A magazine program featuring developments in the fields of health, science, information technology, education and the environment.
1150 Singapore, R Singapore Intl: Regional Press Review. A review of the major issues discussed in the editorials of the regional papers during the week.

Mondays

1100 Australia, Radio: RA News. See S 0000.
1100 Singapore, R Singapore Intl: News. See S 1100.
1109 Singapore, R Singapore Intl: Business and Market Report. A roundup of financial and business news.
1110 Australia, Radio: Asia Pacific (repeat). See S 2310.
1115 Singapore, R Singapore Intl: Arts Arena. A program devoted to the visual and performing arts featuring interviews with key personalities.
1125 Singapore, R Singapore Intl: Eco-Watch. A capsule on nature and the environment.
1130 Australia, Radio: Sport. See M 0530.
1130 Singapore, R Singapore Intl: News/Weather. See S 1200.
1135 Australia, Radio: Countrywide. Shane Mahony with daily issues in primary industry.
1135 Singapore, R Singapore Intl: E-Z Beat. Adult contemporary music program.
1145 Singapore, R Singapore Intl: Newsline. An analysis of the news making headlines in Singapore, the region, and the world.
1150 Singapore, R Singapore Intl: The Front Page. Headlines from the front pages of Singaporean and regional dailies.

Tuesdays

1100 Australia, Radio: RA News. See S 0000.
1100 Singapore, R Singapore Intl: News. See S 1100.
1109 Singapore, R Singapore Intl: Business and Market Report. See M 1109.
1110 Australia, Radio: Asia Pacific (repeat). See S 2310.
1115 Singapore, R Singapore Intl: Profile. See S 1215.
1130 Australia, Radio: Sport. See M 0530.
1130 Singapore, R Singapore Intl: News/Weather. See S 1200.
1135 Australia, Radio: Countrywide. See M 1135.
1135 Singapore, R Singapore Intl: E-Z Beat. See M 1135.
1150 Singapore, R Singapore Intl: The Front Page. See M 1150.

Wednesdays

1100 Australia, Radio: RA News. See S 0000.
1100 Singapore, R Singapore Intl: News. See S 1100.
1109 Singapore, R Singapore Intl: Business and Market Report. See M 1109.
1110 Australia, Radio: Asia Pacific (repeat). See S 2310.
1115 Singapore, R Singapore Intl: Limelight. Interviews with entertainers, fashion designers, gourmets, or anyone who has been in the limelight this week.
1130 Australia, Radio: Sport. See M 0530.
1130 Singapore, R Singapore Intl: News/Weather. See S 1200.
1135 Australia, Radio: Countrywide. See M 1135.
1135 Singapore, R Singapore Intl: Classic Gold. A golden-oldies music program.
1150 Singapore, R Singapore Intl: The Front Page. See M 1150.

Thursdays

1100 Australia, Radio: RA News. See S 0000.
1100 Singapore, R Singapore Intl: Newsday. wghauser@usa.net
1110 Australia, Radio: Asia Pacific (repeat). See S 2310.
1110 Singapore, R Singapore Intl: Business and Market Report. See M 1109.
1115 Singapore, R Singapore Intl: Living. See S 1235.
1125 Singapore, R Singapore Intl: Eco-Destinations. See S 1250.
1130 Australia, Radio: Sport. See M 0530.
1130 Singapore, R Singapore Intl: News/Weather. See S 1200.
1135 Australia, Radio: Countrywide. See M 1135.
1135 Singapore, R Singapore Intl: Love Songs. Focusing on love songs through the ages.
1150 Singapore, R Singapore Intl: The Front Page. See M 1150.

Fridays

1100 Australia, Radio: RA News. See S 0000.
1100 Singapore, R Singapore Intl: News. See S 1100.
1109 Singapore, R Singapore Intl: Business and Market Report. See M 1109.
1110 Australia, Radio: Asia Pacific (repeat). See S 2310.
1115 Singapore, R Singapore Intl: Frontiers. See S 1135.
1130 Australia, Radio: Sport. See M 0530.
1130 Singapore, R Singapore Intl: News/Weather. See S 1200.
1135 Australia, Radio: Countrywide. See M 1135.
1135 Singapore, R Singapore Intl: Classic Gold. See W 1135.
1150 Singapore, R Singapore Intl: The Front Page. See M 1150.

Saturdays

1100 Australia, Radio: RA News. See S 0000.
1100 Singapore, R Singapore Intl: News. See S 1100.
1105 Australia, Radio: Fine Music Australia. See S 0210.
1105 Singapore, R Singapore Intl: Asia Below the Headlines. See T 1235.
1115 Singapore, R Singapore Intl: In Transit. See M 1240.
1120 Singapore, R Singapore Intl: Regional Press Review. See S 1150.
1130 Australia, Radio: Book Reading. See F 2305.
1130 Singapore, R Singapore Intl: News. See S 1100.
1135 Singapore, R Singapore Intl: Arts Arena. See M 1115.
1145 Singapore, R Singapore Intl: Business World. See S 1115.

Frequencies

1200-1300	Anguilla,Caribbean Beacon	11775am			
1200-1300	Australia, Radio	6020pa	6080as	9580pa	9660pa
		9770as			
1200-1300 vl	Australia, VL8A Alice Spg	2310do			
1200-1300 vl	Australia, VL8K Katherine	2485do			
1200-1300 vl	Australia, VL8T Tent Crk	2325do			
1200-1300	Brazil, R Nacional Bras	15445am			
1200-1300	Bulgaria, Radio	15175eu	17585eu		
1200-1215	Cambodia, Natl Radio Of	11940as			
1200-1300 vl	Canada, CBC N Quebec Svc	9625do			
1200-1300	Canada, CFRX Toronto	6070do			
1200-1300	Canada, CFVP Calgary	6030do			
1200-1300	Canada, CHNX Halifax	6130do			
1200-1300	Canada, CKZN St John's	6160do			
1200-1300	Canada, CKZU Vancouver	6160do			
1200-1229	Canada, R Canada Intl	9640am	9660as	11855am	13650am
		15195as			
1200-1300	China, China Radio Intl	6950pa	7385pa	9565as	9715as
		9945as	11660as	11675as	11795eu
		11980as			
1200-1230 vl	China, China Radio Intl	8660as	11700as	12110as	
1200-1300	Costa Rica,RF Peace Intl	15050am			
1200-1300	Ecuador, HCJB	12005am	15115am	21455am	
1200-1300 as	Eqt Guinea, R East Africa	15186af			
1200-1300	Eqt Guinea, Radio Africa	9530as			
1200-1300	France, Radio France Intl	11600as	15530am	15540af	17575am
1200-1300	Germany, Sunrise Radio	5850va			
1200-1230 s	Germany, Universal Life	9710as			
1200-1300	Germany,Overcomer Ministr	15715au	15735as	17505pa	
1200-1300	Ireland, Unt Christian BC	6200do			
1200-1300	Jordan, Radio	11690eu			
1200-1220 fa	Kazakhstan, R Almaty Intl	9505eu	9620eu	11720as	
1200-1300	Kenya, Kenya Broadc Corp	4935do			
1200-1230 mtwhf	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
1200-1300	Malaysia, Radio	7295do			
1200-1300 irreg	Malaysia,RTM KotaKinabalu	5980do			
1200-1300 twhfas	N Mariana Is, KHBI Saipan	9355as			
1200-1300 vl	Namibia, NBC	4930af	4965af		
1200-1225	Netherlands, Radio	6045eu	9860eu		
1200-1300	Palau, KHBN/Voice of Hope	9965as			
1200-1300 vl	Papua New Guinea, NBC	4890do			
1200-1300	Singapore,R Singapore Int	6015as	6150as		
1200-1300	South Korea, R Korea Intl	7285as			
1200-1300	Taiwan, Radio Taipei Intl	7130as	9610au		
1200-1300 vl	Tanzania, Radio	5050do			
1200-1300	UK, BBC African Service	6190af	11940af	17830af	17885af
		21660af			
1200-1300	UK, BBC Asian Service	6195as	9580as	9740as	11955as
		15280as	15310as	17785as	
1200-1300	UK, BBC World Service	5965na	6195am	9410eu	9515na
		11760me	12095eu	15220am	15485eu
		15565eu	15575as	17640eu	17705eu
1200-1300	USA, Armed Forces Network	4278am	6458am	12689am	
1200-1300	USA, KAIJ Dallas TX	5810am			
1200-1300	USA, KTBN Salt Lk City UT	7510am			
1200-1300	USA, KWHR Naalehu HI	11565pa			
1200-1300	USA, Voice of America	6160as	9645as	9760as	11715as
		15160as	15425as		
1200-1300	USA, WEWN Birmingham AL	7425na	9465na	15745eu	
1200-1300 mtwhfa	USA, WGTG McCaysville GA	9400am			
1200-1300	USA, WHRI Noblesville IN	6040am	9495am		
1200-1300	USA, WJCR Upton KY	7490na	13595na		
1200-1300	USA, WRMI/R Miami Intl	9955ca			
1200-1300 mwh	USA, WSHB Cypress Crk SC	6095na			
1200-1300 a	USA, WSHB Cypress Crk SC	11660am			
1200-1300	USA, WWCR Nashville TN	5070am	5935am	7435am	15685am
1200-1300 mtwhfa	USA, WYFR Okeechobee FL	5950na			
1200-1300	USA, WYFR Okeechobee FL	5850na	6015na	17750na	
1200-1228	Uzbekistan, R Tashkent	7285as	9715as	15295as	17775as
1200-1300	Zambia, Christian Voice	6065af			
1200-1300	Zambia, Natl BC Corp	6165do	6265do		
1200-1300 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1206-1300 occsnal	New Zealand, R NZ Intl	6100pa			
1209-1215 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1209-1215 as	UK, BBC World Service	6195am	15220am		
1210-1240	Mongolia, Voice of	12085au			
1215-1300	Egypt, Radio Cairo	17595as			
1220-1240 w	Kazakhstan, R Almaty Intl	9505eu	9620eu	11720as	
1229-1259	Canada, R Canada Intl	9640am	11855am	13650am	
1230-1300	Austria, R Austria Intl	6155eu	13730na		
1230-1300	Bangladesh, Bangla Betar	7185as	9550as		
1230-1300	Guam, AWR/KSDA	13720as			
1230-1300	Italy, AWR Europe	7230as			
1230-1300	South Korea, R Korea Intl	6055as	9570as	9640am	13670as
1230-1300	Sri Lanka, Sri Lanka BC	9730as	15425as		
1230-1300	Sweden, Radio	13740as	15240au		
1230-1300	Thailand, Radio	9655as	9885as	11905as	
1230-1300 a	USA, Voice of America	7768eu			
1230-1300	Vietnam, Voice of	9840as	12020as	15010as	
1240-1250	Greece, Voice of	17525af			
1240-1300 t	Kazakhstan, R Almaty Intl	9505eu	9620eu	11720as	
1240-1255 smtwh	UK, BBC Slow Speed News	7140me	11820me	13660af	15180af
		15555me	17585af		

Selected Programs

Sundays

1200 Australia, Radio: RA News. See S 0000.
1200 Singapore, R Singapore Intl: News/Weather. A five-minute summary.
1205 Australia, Radio: Country Club (Part 1). ABC's program of contemporary and traditional country music with Richard Porteous (1st Hour).
1205 Singapore, R Singapore Intl: Instrumentals. wghauser@usa.net
1215 Singapore, R Singapore Intl: Profile. A personality profile of prominent Singaporeans and foreigners who have made their mark in their chosen fields.
1230 Singapore, R Singapore Intl: News. See S 1100.
1235 Singapore, R Singapore Intl: Living. A lifestyle magazine that looks at leisure, food, culture, heritage, fashion, travel, and consumer trends.
1245 Singapore, R Singapore Intl: Snapshots. Visits to places of interest in Singapore and the region.
1250 Singapore, R Singapore Intl: Eco-Destinations. A 5-minute series of programs on eco-tourism in Sarawak.
1255 Singapore, R Singapore Intl: Comment. A personal viewpoint of a political, economic, social or cultural issue of interest to Singapore and the region.

Mondays

1200 Australia, Radio: RA News. See S 0000.
1200 Singapore, R Singapore Intl: News. See S 1100.
1205 Australia, Radio: Late Night Live. Topical, political, cultural and philosophical issues with Phillip Adams of Radio National.
1205 Singapore, R Singapore Intl: Newsline. See M 1145.
1220 Singapore, R Singapore Intl: Reflections. See S 1105.
1230 Singapore, R Singapore Intl: Business and Market Report. See M 1109.
1235 Singapore, R Singapore Intl: Indonesia Today. An analysis of the issues currently appearing in the media.
1240 Singapore, R Singapore Intl: In Transit. An interesting aspect of a regional destination and a conversation with someone from the country being visited.
1245 Singapore, R Singapore Intl: Profile. See S 1215.

Tuesdays

1200 Australia, Radio: RA News. See S 0000.
1200 Singapore, R Singapore Intl: News. See S 1100.
1205 Australia, Radio: Late Night Live. See M 1205.
1205 Singapore, R Singapore Intl: Newsline. See M 1145.
1220 Singapore, R Singapore Intl: Living. See S 1235.
1230 Singapore, R Singapore Intl: Business and Market Report. See M 1109.
1235 Singapore, R Singapore Intl: Asia Below the Headlines. A 10-minute montage of colorful snippets from different parts of Asia.
1245 Singapore, R Singapore Intl: Eco-Destinations. See S 1250.
1250 Singapore, R Singapore Intl: Wired Up. See S 1345.

Wednesdays

1200 Australia, Radio: RA News. See S 0000.
1200 Singapore, R Singapore Intl: News. See S 1100.
1205 Australia, Radio: Late Night Live. See M 1205.
1205 Singapore, R Singapore Intl: Newsline. See M 1145.
1220 Singapore, R Singapore Intl: The Written Word. Focus on books, writers, journals and magazines.
1230 Singapore, R Singapore Intl: Business and Market Report. See M 1109.
1235 Singapore, R Singapore Intl: Reflections. See S 1105.
1245 Singapore, R Singapore Intl: Frontiers. See S 1135.

Thursdays

1200 Australia, Radio: RA News. See S 0000.
1200 Singapore, R Singapore Intl: News. See S 1100.
1205 Australia, Radio: Late Night Live. See M 1205.
1205 Singapore, R Singapore Intl: Newsline. See M 1145.
1220 Singapore, R Singapore Intl: Arts Arena. See M 1115.
1230 Singapore, R Singapore Intl: Business and Market Report. See M 1109.
1235 Singapore, R Singapore Intl: Currency Crisis for Beginners. See S 1335.
1240 Singapore, R Singapore Intl: Limelight. See W 1115.

Fridays

1200 Australia, Radio: RA News. See S 0000.
1200 Singapore, R Singapore Intl: Newsday. wghauser@usa.net
1205 Australia, Radio: Sound Quality. Tim Ritchie of National Radio presents innovations in contemporary music.
1205 Singapore, R Singapore Intl: Newsline. See M 1145.
1220 Singapore, R Singapore Intl: Snapshots. See S 1245.
1225 Singapore, R Singapore Intl: Currencies. Regional currency movements during the week.
1230 Singapore, R Singapore Intl: Business and Market Report. See M 1109.
1235 Singapore, R Singapore Intl: Regional Press Review. See S 1150.
1245 Singapore, R Singapore Intl: Business World. See S 1115.

Saturdays

1200 Australia, Radio: RA News. See S 0000.
1200 Singapore, R Singapore Intl: News/Weather. See S 1200.
1205 Australia, Radio: The Week's End. See S 0430.
1205 Singapore, R Singapore Intl: Instrumentals. wghauser@usa.net
1220 Singapore, R Singapore Intl: The Written Word. See W 1220.
1230 Australia, Radio: Pacific Review. See S 0530.
1230 Singapore, R Singapore Intl: News. See S 1100.
1235 Singapore, R Singapore Intl: Wired Up. See S 1345.
1245 Singapore, R Singapore Intl: Comment. See S 1255.
1250 Singapore, R Singapore Intl: Currency Crisis for Beginners. See S 1335.

1300 UTC SHORTWAVE GUIDE 8:00 AM EST 5:00 AM PST

Frequencies

1300-1400	Anguilla,Caribbean Beacon	11775am			
1300-1330	Australia, Radio	9770as			
1300-1400	Australia, Radio	5995pa	6020pa	6080as	9580pa
		9660pa			
1300-1400 vl	Australia, VL8A Alice Spg	2310do			
1300-1400 vl	Australia, VL8K Katherine	2485do			
1300-1400 vl	Australia, VL8T Tent Crk	2325do			
1300-1320	Brazil, R Nacional Bras	15445am			
1300-1400 vl	Canada, CBC N Quebec Svc	9625do			
1300-1400	Canada, CFRX Toronto	6070do			
1300-1400	Canada, CFVP Calgary	6030do			
1300-1400	Canada, CHNX Halifax	6130do			
1300-1400	Canada, CKZN St John's	6160do			
1300-1400	Canada, CKZU Vancouver	6160do			
1300-1400 smtwhf	Canada, R Canada Intl	11855am	13650am		
1300-1400 mtwhf	Canada, R Canada Intl	9640am			
1300-1400	China, China Radio Intl	7385pa	7405na	9945pa	11660as
		11675pa	11980as	15180as	
1300-1400	Costa Rica,RF Peace Intl	15050am			
1300-1330	Czech Rep, Radio Prague	13580as	21745af		
1300-1400	Ecuador, HCJB	12005am	15115am	21455am	
1300-1330	Egypt, Radio Cairo	17595as			
1300-1400	Eqt Guinea, R East Africa	15186af			
1300-1400	Eqt Guinea, Radio Africa	9530as			
1300-1400	France, Radio France Intl	9805eu	15155eu	15195eu	
1300-1400	Germany, Sunrise Radio	5850va			
1300-1330 s	Germany, Universal Life	12025as			
1300-1400 a	Germany,Good News World R	15385eu			
1300-1400	Germany,Overcomer Ministr	15625pa	15735as		
1300-1400	Ireland, Unt Christian BC	6200do			
1300-1400	Jordan, Radio	11690eu			
1300-1400	Kenya, Kenya Broadc Corp	4935do			
1300-1310	Liberia,LCN/R Liberia Int	5100do			
1300-1400	Malaysia, Radio	7295do			
1300-1400 irreg	Malaysia,RTM KotaKinabalu	5980do			
1300-1400 twhfas	N Mariana Is, KHBI Saipan	9355as			
1300-1400 vl	Namibia, NBC	4930af	4965af		
1300-1400 occsnal	New Zealand, R NZ Intl	6100pa			
1300-1400	Palau, KHBN/Voice of Hope	9985as			
1300-1400 vl	Papua New Guinea, NBC	4890do			
1300-1355	Poland, Polish R Warsaw	6095eu	7270eu	9525eu	11820eu
1300-1400	Romania, R Romania Intl	15250na	15390eu	17770eu	17790na
1300-1400 as	S Africa, Channel Africa	9445af	17675af	17870af	
1300-1400	Singapore,R Singapore Int	6015as	6150as		
1300-1400	Sri Lanka, Sri Lanka BC	9730as	15425as		
1300-1400	Switzerland, Swiss R Intl	7230as	7480as		
1300-1330	Switzerland, Swiss R Intl	9535eu			
1300-1400 vl	Tanzania, Radio	5050do			
1300-1400	UK, BBC African Service	6190af	11940af	15420af	17830af
		17885af	21660af		
1300-1400	UK, BBC Asian Service	5990as	6195as	9740as	11750as
		15310as			
1300-1400	UK, BBC World Service	5965na	6195am	9410eu	9515na
		11760me	11865na	12095eu	15220am
		15485eu	15565eu	15575eu	17640eu
		17705eu			
1300-1400	USA, Armed Forces Network	4278am	6458am	12689am	
1300-1400	USA, KAIJ Dallas TX	5810am			
1300-1400	USA, KTBN Salt Lk City UT	7510am			
1300-1400	USA, KWHR Naalehu HI	11565pa			
1300-1400	USA, Voice of America	6160as	9645as	9760as	11715as
		15160as	15425as		
1300-1400	USA, WEWN Birmingham AL	7425na	9465na	15745eu	
1300-1400 mtwhfa	USA, WGTG McCaysville GA	9400am			
1300-1400	USA, WHRI Noblesville IN	6040am	15105am		
1300-1400	USA, WJCR Upton KY	7490na	13595na		
1300-1400	USA, WRMI/R Miami Intl	9955ca			
1300-1400 mtwhas	USA, WSHB Cypress Crk SC	9410na			
1300-1400 tf	USA, WSHB Cypress Crk SC	11660am			
1300-1400	USA, WWCR Nashville TN	5070am	7435am	13845am	15685am
1300-1400	USA, WYFR Okeechobee FL	11830na	11970na	13695na	17750na
1300-1400	Zambia, Christian Voice	6065af			
1300-1400	Zambia, Natl BC Corp	6165do	6265do		
1300-1400 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1302-1400	USA, WYFR Okeechobee FL	11550as			
1305-1310	Croatia, Croatian Radio	7125eu	9830eu		
1315-1400 mtwhfa	Bhutan, Bhutan BC Service	5030do			
1330-1355	Belgium, R Vlaanderen Int	15545na			
1330-1359	Canada, R Canada Intl	9535as	11795as	11935eu	15325eu
1330-1359 mtwhfa	Canada, R Canada Intl	17820va			
1330-1400	Guam, AWR/KSDA	9650as			
1330-1400	India, All India Radio	9545as	11620as	13710as	
1330-1400	Netherlands, Radio	9890as	15585as		
1330-1400	Sweden, Radio	13740as	15240am	17515au	
1330-1400	Turkey, Voice of	15185as	17830as		
1330-1400	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1330-1400	Uzbekistan, R Tashkent	7285as	9715as	15295as	17775as
1330-1400	Vietnam, Voice of	9840eu	12020as	15010as	
1335-1345	Greece, Voice of	9395eu	11730na	15175eu	15630eu
1345-1400	Vatican State, Vatican R	13765au	15540au		

Selected Programs

Sundays

1300 Australia, Radio: RA News. See S 0000.
1300 Singapore, R Singapore Intl: News. See S 1100.
1305 Australia, Radio: Country Club (Part 2). ABC's program of contemporary and traditional country music with Richard Porteous (2nd Hour).
1305 Singapore, R Singapore Intl: Friends of the Airwaves. Listener letters and colorful lifestyle snippets from the region.
1330 Singapore, R Singapore Intl: News. See S 1100.
1335 Singapore, R Singapore Intl: Currency Crisis for Beginners. A simplified discussion of the various aspects of the Indonesia financial crisis.
1345 Singapore, R Singapore Intl: Wired Up. Interesting thoughts surfacing on the Internet.
1355 Singapore, R Singapore Intl: News. See S 1100.

Mondays

1300 Australia, Radio: RA News. See S 0000.
1300 Singapore, R Singapore Intl: News. See S 1100.
1305 Singapore, R Singapore Intl: Singa-Pop. A showcase of homegrown Singaporean talents and local songs.
1315 Australia, Radio: The Planet (Part 1). Lucky Oceans plays richly varied music from around the world.
1330 Singapore, R Singapore Intl: News. See S 1100.
1335 Singapore, R Singapore Intl: Snapshots. See S 1245.
1340 Singapore, R Singapore Intl: Newsline. See M 1145.
1355 Singapore, R Singapore Intl: News. See S 1100.

Tuesdays

1300 Australia, Radio: RA News. See S 0000.
1300 Singapore, R Singapore Intl: News. See S 1100.
1305 Singapore, R Singapore Intl: Music and Memories. A musical journey down memory lane.
1315 Australia, Radio: The Planet (Part 1). See M 1315.
1330 Singapore, R Singapore Intl: News. See S 1100.
1335 Singapore, R Singapore Intl: Indonesia Today. See M 1235.
1340 Singapore, R Singapore Intl: Newsline. See M 1145.
1355 Singapore, R Singapore Intl: News. See S 1100.

Wednesdays

1300 Australia, Radio: RA News. See S 0000.
1300 Singapore, R Singapore Intl: News. See S 1100.
1305 Singapore, R Singapore Intl: Spin the Globe. A selection of world music.
1315 Australia, Radio: The Planet (Part 1). See M 1315.
1330 Singapore, R Singapore Intl: News. See S 1100.
1335 Singapore, R Singapore Intl: In Transit. See M 1240.
1340 Singapore, R Singapore Intl: Newsline. See M 1145.
1355 Singapore, R Singapore Intl: News. See S 1100.

Thursdays

1300 Australia, Radio: RA News. See S 0000.
1300 Singapore, R Singapore Intl: News. See S 1100.
1305 Singapore, R Singapore Intl: Singa-Pop. See M 1305.
1315 Australia, Radio: The Planet (Part 1). See M 1315.
1330 Singapore, R Singapore Intl: News. See S 1100.
1335 Singapore, R Singapore Intl: Eco-Watch. See M 1125.
1340 Singapore, R Singapore Intl: Newsline. See M 1145.
1355 Singapore, R Singapore Intl: News. See S 1100.

Fridays

1300 Australia, Radio: RA News. See S 0000.
1300 Singapore, R Singapore Intl: News. See S 1100.
1305 Singapore, R Singapore Intl: Hot Trax. Information about new music releases in Singapore.
1315 Australia, Radio: The Planet (Part 1). See M 1315.
1330 Singapore, R Singapore Intl: News. See S 1100.
1335 Singapore, R Singapore Intl: Comment. See S 1255.
1340 Singapore, R Singapore Intl: Friday Feature. wghauser@usa.net
1355 Singapore, R Singapore Intl: News. See S 1100.

Saturdays

1300 Australia, Radio: Radio National News. See F 1400.
1300 Singapore, R Singapore Intl: News. See S 1100.
1305 Australia, Radio: Science Show. See T 0110.
1305 Singapore, R Singapore Intl: Spin the Globe. See W 1305.
1330 Singapore, R Singapore Intl: News. See S 1100.
1335 Singapore, R Singapore Intl: Currencies. See F 1225.
1340 Singapore, R Singapore Intl: Limelight. See W 1115.
1355 Singapore, R Singapore Intl: News. See S 1100.

Tian Wei hosts "Voices from Other Lands" on CRI's English Service

Frequencies

1400-1500	Anguilla,Caribbean Beacon	11775am			
1400-1500	Australia, Radio	5995pa	6020pa	6080as	9580pa
		9660pa			
1400-1500 vl	Australia, VL8A Alice Spg	2310do			
1400-1500 vl	Australia, VL8K Katherine	2485do			
1400-1500 vl	Australia, VL8T Tent Crk	2325do			
1400-1500 vl	Canada, CBC N Quebec Svc	9625do			
1400-1500	Canada, CFRX Toronto	6070do			
1400-1500	Canada, CFVP Calgary	6030do			
1400-1500	Canada, CHNX Halifax	6130do			
1400-1500	Canada, CKZN St John's	6160do			
1400-1500	Canada, CKZU Vancouver	6160do			
1400-1500 s	Canada, R Canada Intl	11855am	13650am		
1400-1500	China, China Radio Intl	7260as	7405na	9535as	9700as
		11825as			
1400-1500	Costa Rica,RF Peace Intl	15050am			
1400-1500	Ecuador, HCJB	12005am	15115am	21455am	
1400-1500 as	Eqt Guinea, R East Africa	15186af			
1400-1500	France, Radio France Intl	11910as	15405as	17560af	
1400-1500	Germany, Sunrise Radio	5850va			
1400-1430 s	Germany, Universal Life	9955na			
1400-1500	Germany,Overcomer Ministr	13810me	15625pa		
1400-1500	Ireland, Unt Christian BC	6200do			
1400-1500	Japan, R Japan/NHK World	9505na	11730as	11880af	
1400-1500	Jordan, Radio	11690eu			
1400-1500	Kenya, Kenya Broadc Corp	4935do			
1400-1500	Malaysia, Radio	7295do			
1400-1500 vl	Malaysia, RTM Kuching	4895do	7160do		
1400-1500 irreg	Malaysia,RTM KotaKinabalu	5980do			
1400-1500 vl	Namibia, NBC	4930af	4965af		
1400-1500	Netherlands, Radio	9890as	15585as		
1400-1500 occsnal	New Zealand, R NZ Intl	6100pa			
1400-1410	Pakistan, Radio	9650as	11570me	15170af	
1400-1500 as	Palau, KHBN/Voice of Hope	9985as			
1400-1500 vl	Papua New Guinea, NBC	4890do			
1400-1500	Philippines, FEBC/R Intl	11995as			
1400-1455 as	S Africa, Channel Africa	9445af	17675af	17870af	
1400-1500	Singapore,RCorp Singapore	6150do			
1400-1500	Sri Lanka, Sri Lanka BC	9730as	15425as		
1400-1500	Switzerland, Swiss R Intl	9575as	15265as		
1400-1500 vl	Tanzania, Radio	5050do			
1400-1430	Thailand, Radio	9655as	9830as	11905as	
1400-1430	Turkey, Voice of	11995eu	15185as	17830eu	
1400-1500	UK, BBC African Service	6190af	11940af	17830af	21490af
		21660af			
1400-1500	UK, BBC Asian Service	5990as	6195as	9740as	11750as
		15310as			
1400-1500	UK, BBC World Service	9410eu	9515na	11865na	12095eu
		15220na	15485eu	15565eu	15575eu
		17640eu	17705eu	17840am	
1400-1500	USA, Armed Forces Network	4278am	6458am	12689am	
1400-1500	USA, KAIJ Dallas TX	5810am			
1400-1500	USA, KJES Mesquite NM	11715am			
1400-1500	USA, KTBN Salt Lk City UT	7510am			
1400-1500	USA, KWHR Naalehu HI	11565pa			
1400-1500	USA, Voice of America	6160as	7125as	7215as	9645as
		9760as	15160as	15255va	15395as
		15425as			
1400-1500	USA, WEWN Birmingham AL	7425na	9465na	15745eu	
1400-1500 mtwhfa	USA, WGTG McCaysville GA	9400am			
1400-1500	USA, WHRI Noblesville IN	6040am	15105am		
1400-1500	USA, WJCR Upton KY	7490na	13595na		
1400-1430 a	USA, WRMI/R Miami Intl	9955ca			
1400-1500	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1400-1500	USA, WYFR Okeechobee FL	11502as	11830na	11970na	17750na
1400-1405	Vatican State, Vatican R	13765au	15540au		
1400-1500	Zambia, Christian Voice	6065af			
1400-1500	Zambia, Natl BC Corp	6165do	6265do		
1400-1500 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1415-1425	Nepal, Radio	5005do	7165do		
1430-1500	Australia, Radio	9500as	11660as		
1430-1500 vl	China, China Radio Intl	8660as	9880as		
1430-1500	Guam, AWR/KSDA	9385as			
1430-1500	Mongolia, Voice of	9720as	12085as		
1430-1500	Myanmar, Radio	5986do			
1430-1500 as	USA, WRMI/R Miami Intl	9955ca			

Selected Programs

Sundays

1400 Australia, Radio: RA News. See S 0000.
1400 Japan, NHK/Radio: News. See S 0000.
1400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1400 USA, KJES (Mesquite NM): Religious Chanting.
1405 Australia, Radio: Other Worlds (Part 1). Brent Clough plays late night lounge music (1st hour).
1410 Japan, NHK/Radio: Asia Weekly. A magazine of news from other Asian broadcasters, entertainment update and music.

Mondays

1400 Australia, Radio: RA News. See S 0000.
1400 Japan, NHK/Radio: News. See S 0000.
1400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1400 USA, KJES (Mesquite NM): Religious Chanting.
1405 Australia, Radio: The Planet (Part 2). See M 1315.
1415 Japan, NHK/Radio: 44 Minutes. See M 0015.
1417 Japan, NHK/Radio: Guest Corner. See M 0017.
1434 Japan, NHK/Radio: Close Up. See M 0034.
1447 Japan, NHK/Radio: News Commentary. See M 0047.
1452 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Tuesdays

1400 Australia, Radio: RA News. See S 0000.
1400 Japan, NHK/Radio: News. See S 0000.
1400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1400 USA, KJES (Mesquite NM): Religious Chanting.
1405 Australia, Radio: The Planet (Part 2). See M 1315.
1415 Japan, NHK/Radio: 44 Minutes. See M 0015.
1417 Japan, NHK/Radio: Guest Corner. See M 0017.
1434 Japan, NHK/Radio: Close Up. See M 0034.
1447 Japan, NHK/Radio: News Commentary. See M 0047.
1452 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Wednesdays

1400 Australia, Radio: RA News. See S 0000.
1400 Japan, NHK/Radio: News. See S 0000.
1400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1400 USA, KJES (Mesquite NM): Religious Chanting.
1405 Australia, Radio: The Planet (Part 2). See M 1315.
1415 Japan, NHK/Radio: 44 Minutes. See M 0015.
1417 Japan, NHK/Radio: Guest Corner. See M 0017.
1434 Japan, NHK/Radio: Close Up. See M 0034.
1447 Japan, NHK/Radio: News Commentary. See M 0047.
1452 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Thursdays

1400 Australia, Radio: RA News. See S 0000.
1400 Japan, NHK/Radio: News. See S 0000.
1400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1400 USA, KJES (Mesquite NM): Religious Chanting.
1405 Australia, Radio: The Planet (Part 2). See M 1315.
1415 Japan, NHK/Radio: 44 Minutes. See M 0015.
1417 Japan, NHK/Radio: Guest Corner. See M 0017.
1434 Japan, NHK/Radio: Close Up. See M 0034.
1447 Japan, NHK/Radio: News Commentary. See M 0047.
1452 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Fridays

1400 Australia, Radio: Radio National News. News from the Australian Broadcasting Network (ABC).
1400 Japan, NHK/Radio: News. See S 0000.
1400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1400 USA, KJES (Mesquite NM): Religious Chanting.
1405 Australia, Radio: The Planet (Part 2). See M 1315.
1415 Japan, NHK/Radio: 44 Minutes. See M 0015.
1417 Japan, NHK/Radio: Guest Corner. See M 0017.
1434 Japan, NHK/Radio: Close Up. See M 0034.
1447 Japan, NHK/Radio: News Commentary. See M 0047.
1452 Japan, NHK/Radio: Tumbling Dice. See M 0052.

Saturdays

1400 Australia, Radio: Radio National News. See F 1400.
1400 Japan, NHK/Radio: News. See S 0000.
1400 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1400 USA, KJES (Mesquite NM): Religious Chanting.
1405 Australia, Radio: New Dimensions. No information available.
1410 Japan, NHK/Radio: Weekend Break. See A 0110.

Hello, Writers...

Do you have a topic you've always "thought about" writing up for Monitoring Times? Now is the time! Given our full-spectrum coverage, plus the interest in new technology on the one hand and nostalgia for the past on the other, there is no limit to appropriate subject matter to write about. Bone up on your research, warm up your pen, and you, too, can earn a little spending money!

Pitch your idea to the editor at mteditor@grove.net or call 828-837-9200 and ask for Rachel. Writer's Guidelines are available on the MT homepage at www.grove-ent.com, or for an SASE.

1500 UTC SHORTWAVE GUIDE 10:00 AM EST 7:00 AM PST

Frequencies

1500-1600	Anguilla,Caribbean Beacon	11775am			
1500-1600	Australia, Radio	5995pa	6020pa	6080as	9500as
		9580pa	9660pa	11660as	
1500-1600 vl	Australia, VL8A Alice Spg	2310do			
1500-1600 vl	Australia, VL8K Katherine	2485do			
1500-1600 vl	Australia, VL8T Tent Crk	2325do			
1500-1600 vl	Canada, CBC N Quebec Svc	9625do			
1500-1600	Canada, CFRX Toronto	6070do			
1500-1600	Canada, CFVP Calgary	6030do			
1500-1600	Canada, CHNX Halifax	6130do			
1500-1600	Canada, CKZN St John's	6160do			
1500-1600	Canada, CKZU Vancouver	6160do			
1500-1559 s	Canada, R Canada Intl	11855am	13650am		
1500-1600	China, China Radio Intl	7160as	9785va		
1500-1600	Ecuador, HCJB	12005am	15115am	21455am	
1500-1600 as	Eqt Guinea, R East Africa	15186af			
1500-1600	Germany, Sunrise Radio	5850va			
1500-1600	Germany,Overcomer Ministr	13810me	15420na		
1500-1600	Guam, TWR/KTWR	15330as			
1500-1600	Ireland, Unt Christian BC	6200do			
1500-1530	Israel, Kol Israel	15650va	17535va		
1500-1600	Japan, R Japan/NHK World	7200as	9505na	9750as	11730as
1500-1600	Jordan, Radio	11690eu			
1500-1600	Kenya, Kenya Broadc Corp	4935do			
1500-1510	Liberia,LCN/R Liberia Int	5100do			
1500-1600	Malaysia, Radio	7295do			
1500-1600 irreg	Malaysia,RTM KotaKinabalu	5980do			
1500-1530	Mexico, Radio Mexico Intl	5985na	9705na		
1500-1600	Myanmar, Radio	5986do			
1500-1600 vl	Namibia, NBC	4930af	4965af		
1500-1525	Netherlands, Radio	9890as	15585as		
1500-1600 occsnal	New Zealand, R NZ Intl	6100pa			
1500-1600	Nigeria, Voice of	7255af	15120af		
1500-1600	North Korea, R Pyongyang	3560as	9640va	9975me	11335am
		11735am	13650va		
1500-1530 as	Palau, KHBN/Voice of Hope	9985as			
1500-1600 vl	Papua New Guinea, NBC	4890do			
1500-1600	Philippines, FEBC/R Intl	11995as			
1500-1600	Russia,Voice of Russia WS	4730as	4940as	4975as	7510as
		11655as	12025as	15510as	17570as
1500-1530	S Africa, Channel Africa	9445af			
1500-1530 twhfa	Seychelles, FEBA Radio	11600as			
1500-1545 sm	Seychelles, FEBA Radio	11600as			
1500-1600	Singapore, RTE Radio	15360as	15625as		
1500-1600	Singapore,RCorp Singapore	6150do			
1500-1600	Sri Lanka, Sri Lanka BC	9730as	15425as		
1500-1600 vl	Tanzania, Radio	5050do			
1500-1600	UK, BBC African Service	6190af	11860af	11940af	15400af
		15420af	17830af	21470af	21490af
		21660af			
1500-1600	UK, BBC Asian Service	5975as	5990as	6195as	7135as
		9740as	11750as	15310as	
1500-1600	UK, BBC World Service	9410eu	9515na	11865na	12040eu
		12095eu	15220na	15485eu	15575eu
		17705eu	17840am		
1500-1600	USA, Armed Forces Network	4278am	6458am	12689am	
1500-1600	USA, KAIJ Dallas TX	13815am			
1500-1600	USA, KJES Mesquite NM	11715am			
1500-1600	USA, KTBN Salt Lk City UT	15590am			
1500-1600	USA, KWHR Naalehu HI	11565pa			
1500-1600	USA, Voice of America	6110as	6160as	7125as	7215as
		9645as	9700me	9760as	15205va
		15255va	15395as		
1500-1600	USA, WEWN Birmingham AL	9455na	11875na	15745eu	
1500-1600 mtwhfa	USA, WGTG McCaysville GA	9400am			
1500-1600	USA, WHRI Noblesville IN	13760am	15105am		
1500-1600	USA, WJCR Upton KY	7490na	13595na		
1500-1600 as	USA, WRMI/R Miami Intl	9955ca			
1500-1600	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1500-1600	USA, WYFR Okeechobee FL	11830na	17750na		
1500-1502	USA, WYFR Okeechobee FL	11550as			
1500-1600	Zambia, Christian Voice	6065af			
1500-1600	Zambia, Natl BC Corp	6165do	6265do		
1500-1600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1530-1600	Guam, AWR/KSDA	11980as			
1530-1545	India, All India Radio	6150as			
1530-1600	Iran, VOIRI	7215as	11775as	13605me	
1535-1550	Vatican State, Vatican R	13765au	15500au		
1550-1600 a	Vatican State, Vatican R	13765va	15500va		

Selected Programs

Sundays

1500 Australia, Radio: RA News. See S 0000.
1500 Israel, Kol Israel: News. See S 0500.
1500 Nigeria, Voice of: Perspectives (biweekly). Global issues from the Nigerian and African point of view.
1500 Nigeria, Voice of: Reaching Out (biweekly). A review of both government and private projects of a humanitarian nature.
1500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1505 Australia, Radio: Other Worlds (Part 2). Brent Clough plays late night lounge music (2nd hour).
1516 Israel, Kol Israel: You're on the Air (live). In this phone-in program, listeners question a prominent guest in the studio on matters of current affairs.
1528 Israel, Kol Israel: Top Stories. News headlines at the end of the broadcast.
1530 Nigeria, Voice of: In the News. Fifteen minutes of the news behind the news.

Mondays

1500 Australia, Radio: RA News. See S 0000.
1500 Israel, Kol Israel: News. See S 0500.
1500 Nigeria, Voice of: Health Corner (biweekly). Health-related problems and medical research and innovations.
1500 Nigeria, Voice of: Towards a Common Destiny (biweekly). Analyses of the economic and political issues which link African countries in their development.
1500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1505 Australia, Radio: Asia Pacific. See S 2310.
1523 Israel, Kol Israel: Business News.
1530 Australia, Radio: The Health Report. See M 0030.
1530 Nigeria, Voice of: Sixty Minutes. A news magazine program of world and Nigerian news, correspondent reports, press review, and sports.

Tuesdays

1500 Australia, Radio: RA News. See S 0000.
1500 Israel, Kol Israel: News. See S 0500.
1500 Nigeria, Voice of: Bridge Across Time (biweekly). Focus on the struggle for reparations for harm done to Africans through slave trade and colonialism.
1500 Nigeria, Voice of: Striding Ahead (biweekly). The contributions of Nigerian women in particular and African women in general to national development.
1500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1505 Australia, Radio: Asia Pacific. See S 2310.
1528 Israel, Kol Israel: Top Stories. See S 1528.
1530 Australia, Radio: The Law Report. See T 0030.
1530 Nigeria, Voice of: Sixty Minutes. See M 1530.

Wednesdays

1500 Australia, Radio: RA News. See S 0000.
1500 Israel, Kol Israel: News. See S 0500.
1500 Nigeria, Voice of: Nigeria and Politics. See M 0615.
1500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1505 Australia, Radio: Asia Pacific. See S 2310.
1515 Nigeria, Voice of: World of the Arts. See S 0220.
1519 Israel, Kol Israel: Science Watch.
1530 Australia, Radio: The Religion Report. See W 0030.
1530 Nigeria, Voice of: Sixty Minutes. See M 1530.

Thursdays

1500 Australia, Radio: RA News. See S 0000.
1500 Israel, Kol Israel: News. See S 0500.
1500 Nigeria, Voice of: Talking Agriculture (biweekly). See S 0220.
1500 Nigeria, Voice of: Theatre on the Air (biweekly). A radio drama which reflects the rich social and cultural value of the society.
1500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1505 Australia, Radio: Asia Pacific. See S 2310.
1530 Australia, Radio: Money, Markets, and the Economy.
1530 Nigeria, Voice of: Sixty Minutes. See M 1530.

Fridays

1500 Australia, Radio: Radio National News. See F 1400.
1500 Israel, Kol Israel: News. See S 0500.
1500 Nigeria, Voice of: The Developing World. Global developments from the perspective of the developing countries of the world.
1500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1505 Australia, Radio: Asia Pacific. See S 2310.
1513 Israel, Kol Israel: Current Cultural Events in Israel. News from the world of the arts.
1528 Israel, Kol Israel: Top Stories. See S 1528.
1530 Australia, Radio: The Sports Factor. Amanda Smith hosts the program that debates Australia's sporting culture.
1530 Nigeria, Voice of: Sixty Minutes. See M 1530.

Saturdays

1500 Australia, Radio: Radio National News. See F 1400.
1500 Israel, Kol Israel: News. See S 0500.
1500 Nigeria, Voice of: The Young World (biweekly). The activities, experiences, hopes, and aspirations of Nigerian youth are highlighted.
1500 Nigeria, Voice of: Who are the Nigerians (biweekly). A program that seeks to trace ethnic diversity of Nigeria.
1500 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
1505 Australia, Radio: Melisma (Part 1). Musical revelations (1st hour).
1510 Israel, Kol Israel: The Week in Review. A summary and update of the week's most important news.
1530 Nigeria, Voice of: Africa Hour. A news magazine devoted exclusively to African issues.

Frequencies

1600-1700	Algeria, R Algiers Intl	11715af	15160me		
1600-1700	Anguilla,Caribbean Beacon	11775am			
1600-1700	Australia, Radio	5995pa	6020pa	6080as	9500as
		9580pa	9660pa	11660as	
1600-1700 vl	Australia, VL8A Alice Spg	2310do			
1600-1700 vl	Australia, VL8K Katherine	2485do			
1600-1700 vl	Australia, VL8T Tent Crk	2325do			
1600-1700 vl	Canada, CBC N Quebec Svc	9625do			
1600-1700	Canada, CFRX Toronto	6070do			
1600-1700	Canada, CFVP Calgary	6030do			
1600-1700	Canada, CHNX Halifax	6130do			
1600-1700	Canada, CKZN St John's	6160do			
1600-1700	Canada, CKZU Vancouver	6160do			
1600-1700	China, China Radio Intl	9565af	9620af		
1600-1700 as	Costa Rica, Adv World R	9725na			
1600-1627	Czech Rep, Radio Prague	5930eu	17485af		
1600-1700	Ethiopia, Radio	7165af			
1600-1700	France, Radio France Intl	11615af	11705af	12015af	15210af
		15460af	15530af	17850af	
1600-1650	Germany, Deutsche Welle	6170as	7130af	7225as	9735af
		9875as	11810af	15145as	21695af
1600-1700	Germany, Sunrise Radio	5850va			
1600-1700 a	Germany,Good News World R	15105eu			
1600-1700	Germany,Overcomer Ministr	6130eu	13810me	15420na	
1600-1700	Guam, AWR/KSDA	11980as			
1600-1630	Guam, TWR/KTWR	15330as			
1600-1630	Iran, VOIRI	7215as	11775as	13605me	
1600-1700	Ireland, Unt Christian BC	6200do			
1600-1700	Jordan, Radio	11690eu			
1600-1700	Kenya, Kenya Broadc Corp	4935do			
1600-1700	Lebanon, Voice of Hope	9960me			
1600-1700	Malaysia, Radio	7295do			
1600-1630 smtwfa	Mexico, Radio Mexico Intl	5985na	9705na		
1600-1700 vl	Namibia, NBC	4930af	4965af		
1600-1650 occsnal	New Zealand, R NZ Intl	6100pa			
1600-1700	Nigeria, Voice of	7255af	15120af		
1600-1630	Pakistan, Radio	9650as	11570me	15170af	15325eu
		15469eu	17720af		
1600-1700 vl	Papua New Guinea, NBC	4890do			
1600-1700	Russia,Voice of Russia WS	4730me	4940me	4975me	7130me
		7325me	9975me	11775me	15170me
		15470me	15540me	15550as	17580me
1600-1625	S Africa, Channel Africa	6000af			
1600-1700	South Korea, R Korea Intl	5975as	9515va	9870as	
1600-1630	Sri Lanka, Sri Lanka BC	9730as	15425as		
1600-1700	Swaziland, Trans World R	9500af			
1600-1615	Switzerland, Swiss R Intl	9575as	15265as		
1600-1700 vl	Tanzania, Radio	5050do			
1600-1645	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1600-1700	UK, BBC African Service	3255af	6190af	15400af	17705af
		17830af	21470af	21660af	
1600-1606	UK, BBC Asian Service	3915as	5975as	5990as	6195as
		7160as	9740as	11750as	15310as
1600-1700	UK, BBC World Service	9410eu	9515na	12095eu	15485eu
		15575eu	17840am		
1600-1700	USA, Armed Forces Network	4278am	6458am	12689am	
1600-1700	USA, KAIJ Dallas TX	13815am			
1600-1700	USA, KTBN Salt Lk City UT	15590am			
1600-1700	USA, Voice of America	6035af	6110as	6160as	7125as
		7215as	9645as	9700me	9760as
		13600af	13710af	15205va	15225af
		15255va	15395as	15410af	15445af
		17895af			
1600-1700	USA, WEWN Birmingham AL	9455na	11875na	15745eu	
1600-1700 mtwhfa	USA, WGTG McCaysville GA	9400am			
1600-1700	USA, WHRI Noblesville IN	13760am	15105am		
1600-1700	USA, WJCR Upton KY	7490na	13595na		
1600-1700 as	USA, WRMI/R Miami Intl	9955ca			
1600-1700 a	USA, WSHB Cypress Crk SC	18910af			
1600-1700	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1600-1700	USA, WYFR Okeechobee FL	11705na	11830na	15695va	17555va
		17750na	21525va		
1600-1610 a	Vatican State, Vatican R	13765va	15500va		
1600-1630	Vietnam, Voice of	9840eu	12010eu	15010eu	
1600-1700	Zambia, Christian Voice	3330af	4965af		
1600-1700	Zambia, Natl BC Corp	6165do	6265do		
1600-1630 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1606-1615	UK, BBC Asian Service	3915as	5975as	7160as	9740as
		11750as			
1606-1615 mtwhf	UK, BBC Asian Service	5990as	6195as	15310as	
1615-1645 as	UK, BBC African Service	11860af			
1615-1645	UK, BBC African Service	15420af			
1615-1700	UK, BBC Asian Service	3915as	5975as	7160as	9510as
		9740as	11750as		
1615-1700 as	UK, BBC World Service	9515na			
1630-1700	Austria, R Austria Intl	6155eu	11855me	13710as	13730va
1630-1657	Canada, R Canada Intl	6140as	7150as		
1630-1700	Egypt, Radio Cairo	15255af			
1630-1700 a	Germany, Universal Life	12015af			
1630-1700 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1645-1700	Albania, R Tirana Intl	11734eu	12084eu		
1645-1700	Israel, Kol Israel	11605eu	15650va	17515va	
1645-1700	Tajikistan, Radio	7245as			
1645-1700	UK, BBC African Service	11860af	15420af		
1650-1700	Eqt Guinea, Radio Africa	15186af			
1650-1700 mtwhf	New Zealand, R NZ Intl	6145pa			

Selected Programs

Sundays

1600 Australia, Radio: RA News. See S 0000.
1600 Nigeria, Voice of: VON Reporter's Diary. Reporters recount impressions and observations of events in an informal presentation.
1600 South Korea, R Korea Intl: News. See S 0200.
1605 Australia, Radio: The National Interest. Terry Lane takes an incisive look at the week's major events.
1610 South Korea, R Korea Intl: Echoes of Korean Music. A weekly selection of Korean music and the story behind it.
1636 South Korea, R Korea Intl: Multiwave Feedback. A listener-contact show with alternating DX Report and Technical Corner.
1645 Nigeria, Voice of: Images of Nigeria. Tourist attractions in Nigeria such as the country's natural beauty, the wildlife parks, and cultural festivals.

Mondays

1600 Australia, Radio: RA News. See S 0000.
1600 Nigeria, Voice of: Sixty Minutes (from 1530). See S 0220.
1600 South Korea, R Korea Intl: News. See S 0200.
1605 Australia, Radio: Music Deli. Paul Petran present music from a variety of cultures.
1615 South Korea, R Korea Intl: News Commentary. See S 0215.
1615 South Korea, R Korea Intl: Seoul Calling. A magazine program of features and short interviews with pop songs in between.
1630 Nigeria, Voice of: African Writers. The coming of age of African writers and their works is the focus of this program.
1640 South Korea, R Korea Intl: Economic News Briefs. Five minutes of financial news and import/export information.
1645 Nigeria, Voice of: Nigerian Scene. A lively fifteen minute news program about Nigeria.
1645 South Korea, R Korea Intl: Notes of Nostalgia. Discover the rich heritage of music that is distinctly Koreas and the people who created it.

Tuesdays

1600 Australia, Radio: RA News. See S 0000.
1600 Nigeria, Voice of: Sixty Minutes (from 1530). See S 0220.
1600 South Korea, R Korea Intl: News. See S 0200.
1605 Australia, Radio: The Comfort Zone. Architecture and design, gardens, food and travel with Alan Saunders.
1615 South Korea, R Korea Intl: News Commentary. See S 0215.
1620 South Korea, R Korea Intl: Seoul Calling. See M 1615.
1630 Nigeria, Voice of: Roundtable. Discussion of the economic, social, and political changes in different parts of the continent.
1640 South Korea, R Korea Intl: Economic News Briefs. See M 1640.
1645 South Korea, R Korea Intl: Cultural Promenade. A look at Korean cultural and artistic traditions and highlights of activities taking place in Korea.

Wednesdays

1600 Australia, Radio: RA News. See S 0000.
1600 Nigeria, Voice of: Sixty Minutes (from 1530). See S 0220.
1600 South Korea, R Korea Intl: News. See S 0200.
1605 Australia, Radio: Women Out Loud!. A weekly radio program documenting, exploring and challenging the conditions of women's lives.
1615 South Korea, R Korea Intl: News Commentary. See S 0215.
1620 South Korea, R Korea Intl: Seoul Calling. See M 1615.
1630 Nigeria, Voice of: Musical Heritage. The pure music of Africa (devoid of foreign influences) is featured.
1640 South Korea, R Korea Intl: Economic News Briefs. See M 1640.
1645 Nigeria, Voice of: ECOWAS Today. A program that analyzes the aims and objectives of the ECOWAS organization.
1645 South Korea, R Korea Intl: Reaching Forward. A look at South Korea's advancements in technology and how it is coping with the financial crisis.

Thursdays

1600 Australia, Radio: RA News. See S 0000.
1600 Nigeria, Voice of: Sixty Minutes (from 1530). See S 0220.
1600 South Korea, R Korea Intl: News. See S 0200.
1605 Australia, Radio: Hindsight. Michelle Rayner presents current events from an historical perspective.
1610 South Korea, R Korea Intl: News Commentary. See S 0215.
1615 South Korea, R Korea Intl: Seoul Calling. See M 1615.
1630 Nigeria, Voice of: VON Link-Up. Call-in request and dedication music program.
1640 South Korea, R Korea Intl: Economic News Briefs. See M 1640.
1645 South Korea, R Korea Intl: Tales from Korea's Past. The history of Korea.

Fridays

1600 Australia, Radio: Radio National News. See F 1400.
1600 Nigeria, Voice of: Sixty Minutes (from 1530). See S 0220.
1600 South Korea, R Korea Intl: News. See S 0200.
1605 Australia, Radio: Awaye. See M 0110.
1615 South Korea, R Korea Intl: News Commentary. See S 0215.
1620 South Korea, R Korea Intl: Sites and Sounds. A look at Korea's tourist attractions and industry.
1630 Nigeria, Voice of: Top Stars. The Nigerian pop music scene, it's hit tunes and top music stars.
1630 South Korea, R Korea Intl: Let's Learn Korean!. Korean language lessons for native English speakers.
1645 Nigeria, Voice of: Issues of the Moment. A documentary of evolving political events in Nigeria.
1645 South Korea, R Korea Intl: Globalizing Korea. How today's ordinary Koreans from different walks of life deal and cope with their lives.

Saturdays

1600 Australia, Radio: Radio National News. See F 1400.
1600 Nigeria, Voice of: Africa Hour (from 1530). See S 0220.
1600 South Korea, R Korea Intl: News. See S 0200.
1605 Australia, Radio: Melisma (Part 2). Musical revelations (2nd hour).
1615 South Korea, R Korea Intl: News Commentary. See S 0215.
1620 South Korea, R Korea Intl: Music Trap. See S 0220.
1630 Nigeria, Voice of: Nigerian Mosaic. A light magazine program with potpouri of interviews, music, and gossip.
1640 South Korea, R Korea Intl: From Us to You. See S 0240.
1645 Nigeria, Voice of: To be announced. See S 0220.

Frequencies

1700-1800	Anguilla,Caribbean Beacon	11775am			
1700-1800	Australia, Radio	5995pa	6080as	9500as	9580pa
		11880pa			
1700-1800 vl	Australia, VL8A Alice Spg	2310do			
1700-1800 vl	Australia, VL8K Katherine	2485do			
1700-1800 vl	Australia, VL8T Tent Crk	2325do			
1700-1800 vl	Canada, CBC N Quebec Svc	9625do			
1700-1800	Canada, CFRX Toronto	6070do			
1700-1800	Canada, CFVP Calgary	6030do			
1700-1800	Canada, CHNX Halifax	6130do			
1700-1800	Canada, CKZN St John's	6160do			
1700-1800	Canada, CKZU Vancouver	6160do			
1700-1800	China, China Radio Intl	5220af	7405af	9570af	11910af
1700-1800	Costa Rica,RF Peace Intl	15050am	21460am		
1700-1727	Czech Rep, Radio Prague	5930eu	17485af		
1700-1800	Egypt, Radio Cairo	15255af			
1700-1800	Eqt Guinea, Radio Africa	15186af			
1700-1730	France, Radio France Intl	11615af	15210af	15460af	
1700-1800	Germany, Sunrise Radio	5850va			
1700-1800 a	Germany,Good News World R	11605eu			
1700-1800	Germany,Overcomer Ministr	6130eu	13810me		
1700-1800	Ireland, Unt Christian BC	6200do			
1700-1800	Japan, R Japan/NHK World	6090as	7110eu	9535na	9825as
		15355af			
1700-1730	Jordan, Radio	11690eu			
1700-1800	Kenya, Kenya Broadc Corp	4935do			
1700-1800	Lebanon, Voice of Hope	9960me			
1700-1800	Liberia, Star Radio	5880do			
1700-1800	Malaysia, Radio	7295do			
1700-1751 mtwhf	New Zealand, R NZ Intl	6145pa			
1700-1715 vl	Palau, KHBN/Voice of Hope	9965as			
1700-1800 vl	Papua New Guinea, NBC	4890do			
1700-1800	Romania, R Romania Intl	9510eu	11940eu	15250eu	
1700-1800	Russia,Voice of Russia WS	9675me	11775me	11850me	12065me
		15540me			
1700-1730	S Africa, Channel Africa	15240af			
1700-1800 a	Swaziland, Commercial R	6155do			
1700-1715 mtwh	Swaziland, Trans World R	3200af			
1700-1800	Swaziland, Trans World R	9500af			
1700-1800 vl	Tanzania, Radio	5050do			
1700-1800	UK, BBC African Service	3255af	6005af	6190af	9630af
		11860af	15400af	17830af	
1700-1745	UK, BBC Asian Service	3915as	5975as	7160as	9510as
		9740as			
1700-1800	UK, BBC World Service	6095me	6180eu	6195eu	9410eu
		12095eu	15485eu	15575eu	17840na
1700-1800 w	UK, Merlin Network One	15200eu			
1700-1800	USA, Armed Forces Network	4278am	6458am	12689am	
1700-1800	USA, KAIJ Dallas TX	13815am	15725am		
1700-1800	USA, KTBN Salt Lk City UT	15590am			
1700-1800	USA, Voice of America	6110as	6160as	7125as	7215as
		9645as	9700me	9760af	15135eu
		15255va	15395as	15410af	15445af
		17895af			
1700-1800 mtwhf	USA, Voice of America	5990as	6045as	7150as	9550as
		9770as	11870as	12005as	12050as
		15255as			
1700-1800	USA, WEWN Birmingham AL	11875na	13615na	15375na	15745na
1700-1800 mtwhfa	USA, WGTG McCaysville GA	9400am			
1700-1800	USA, WHRI Noblesville IN	9495am	13760am		
1700-1800	USA, WJCR Upton KY	7490na	13595na		
1700-1800	USA, WMLK Bethel PA	9465am			
1700-1800 mtwhf	USA, WRNO New Orleans LA	15420am			
1700-1800 tha	USA, WSHB Cypress Crk SC	18910af			
1700-1800	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1700-1800	USA, WYFR Okeechobee FL	15695eu	17555af		
1700-1800	Zambia, Christian Voice	3330af	4965af		
1700-1800	Zambia, Natl BC Corp	6165do	6265do		
1700-1800 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1715-1745 vl	Palau, KHBN/Voice of Hope	9965as			
1715-1800	Swaziland, Trans World R	3200af	9500af		
1715-1730	Vatican State, Vatican R	4005eu	5883eu	7250eu	9645eu
		11810eu			
1730-1800	Ascension Is, RTE Radio	17885af			
1730-1755	Belgium, R Vlaanderen Int	5910eu	7290eu		
1730-1800	Guam, AWR/KSDA	9355as	13660me		
1730-1800	Netherlands, Radio	6020af	7120af	11655af	
1730-1800	Philippines, R Pilipinas	11720as	11890as	15190as	
1730-1800	S Africa, AWR Africa	12130af			
1730-1800	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu	
1730-1800 s	Sweden, Radio	13855va	15735va		
1730-1800 mtwhfa	Sweden, Radio	6065va	15735va		
1730-1800 s	UK, BBC Asian Service	9750as	12045as	15565as	
1730-1800	Vatican State, Vatican R	13765af	15570af	17550af	
1745-1800	Bangladesh, Bangla Betar	7185eu	9550eu		
1745-1800	India, All India Radio	7410eu	9650af	9950eu	11620eu
		11935af	13780af	15075af	15200af
1745-1800 vl	Palau, KHBN/Voice of Hope	9965as			
1745-1800	UK, BBC Asian Service	5975as	9510as	9740as	
1752-1800 smtwh	New Zealand, R NZ Intl	11675pa			

1800-1900	Anguilla,Caribbean Beacon	11775am			
1800-1900 mtwhf	Argentina, RAE	15345eu			
1800-1900	Australia, Radio	6080as	7240pa	9500as	9580pa
		9660as	11880pa		
1800-1900 vl	Australia, VL8A Alice Spg	2310do			
1800-1900 vl	Australia, VL8K Katherine	2485do			
1800-1900 vl	Australia, VL8T Tent Crk	2325do			
1800-1830 irreg	Azerbaijan, R Baku	9165do			
1800-1900	Bangladesh, Bangla Betar	7185eu	9550eu		
1800-1900	Brazil, R Nacional Bras	15265va			
1800-1900	Canada, CFRX Toronto	6070do			
1800-1900	Canada, CFVP Calgary	6030do			
1800-1900	Canada, CHNX Halifax	6130do			
1800-1900	Canada, CKZN St John's	6160do			
1800-1900	Canada, CKZU Vancouver	6160do			
1800-1900	Costa Rica,RF Peace Intl	15050am	21460am		
1800-1830	Egypt, Radio Cairo	15255af			
1800-1900	Eqt Guinea, Radio Africa	15186af			
1800-1900	Germany, Sunrise Radio	5850va			
1800-1830 s	Germany, Universal Life	11785af			
1800-1900	Germany, Voice of Hope	6015eu			
1800-1900	Germany,Overcomer Ministr	3975eu	9800af	12055me	
1800-1815	Greece, Voice of	7450eu	9425eu	17705sa	17765na
1800-1900	India, All India Radio	7410eu	9650af	9950eu	11620eu
		11935af	13780af	15075af	15200af
1800-1900	Ireland, Unt Christian BC	6200do			
1800-1900	Kenya, Kenya Broadc Corp	4935do			
1800-1900	Kuwait, Radio	11990am			
1800-1900	Lebanon, Voice of Hope	9960me			
1800-1900	Liberia, Radio Veritas	5470do			
1800-1900	Liberia, Star Radio	5880do			
1800-1815	Liberia,LCN/R Liberia Int	5100do			
1800-1900	Malaysia, Radio	7295do			
1800-1900 s	Morocco, RTVM Marocaine	17815af			
1800-1900 mtwhfa	N Mariana Is, KHBI Saipan	13820as			
1800-1830	Netherlands, Radio	6020af	7120af	11655af	
1800-1900 smtwh	New Zealand, R NZ Intl	11675pa			
1800-1900	North Korea, R Pyongyang	4405as	6575eu	9335eu	11710am
		13760am			
1800-1900 vl	Papua New Guinea, NBC	4890do			
1800-1900	Philippines, R Pilipinas	11720as	11890as	15190as	
1800-1855	Poland, Polish R Warsaw	6095eu	7285eu		
1800-1900	Russia,Voice of Russia WS	7445af	9740eu	9765eu	9775eu
		11695eu	15540af		
1800-1830	S Africa, AWR Africa	3345af	3390af		
1800-1830	S Africa, Channel Africa	15240af			
1800-1900 irreg	Sudan, Radio Omdurman	9200af	9220af		
1800-1900 a	Swaziland, Commercial R	6155do			
1800-1830	Swaziland, Trans World R	3200af	9500af		
1800-1900 vl	Tanzania, Radio	5050do			
1800-1900	UK, BBC African Service	3255af	6190af	11860af	15400af
		17830af			
1800-1830	UK, BBC Asian Service	5975as	9510as	9740as	
1800-1900	UK, BBC World Service	6095me	6180eu	6195eu	9410eu
		12095eu	15485eu	15575eu	
1800-1900 w	UK, Merlin Network One	15200eu			
1800-1900	USA, Armed Forces Network	4278am	6458am	12689am	
1800-1900	USA, KAIJ Dallas TX	13815am			
1800-1900	USA, KTBN Salt Lk City UT	15590am			
1800-1900	USA, Voice of America	6035af	7415af	9760af	11975af
		15410af	15580af	17895af	
1800-1900	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1800-1900 mtwhfa	USA, WGTG McCaysville GA	9400am			
1800-1900	USA, WHRI Noblesville IN	9495am	13760am		
1800-1900	USA, WJCR Upton KY	7490na	13595na		
1800-1900	USA, WMLK Bethel PA	9465am			
1800-1900 mtwhf	USA, WRNO New Orleans LA	15420am			
1800-1900	USA, WSHB Cypress Crk SC	18910af			
1800-1900	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1800-1900	USA, WYFR Okeechobee FL	15695va			
1800-1830	Vietnam, Voice of	7440eu	9840eu	12020eu	15010eu
1800-1900	Yemen, Radio Aden	9780do			
1800-1900	Zambia, Christian Voice	3330af	4965af		
1800-1900	Zambia, Natl BC Corp	6165do	6265do		
1800-1900 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1830-1855	Belgium, R Vlaanderen Int	11810me	17555af		
1830-1900 s	Germany, Universal Life	9490af			
1830-1900	Mongolia, Voice of	9720eu	12085eu		
1830-1900 w	N Mariana Is, KFBS Saipan	9465eu			
1830-1900	Netherlands, Radio	6020af	7120af	9895af	11655af
		15315af	17605af		
1830-1900	Sri Lanka, Sri Lanka BC	6005as			
1830-1900	Swaziland, Trans World R	3200af			
1830-1900	UK, BBC African Service	6005af	9630af		
1830-1900	UK, BBC Asian Service	9740pa			
1830-1900 as	USA, Voice of America	7170af	7330af	9860af	
1840-1850	Greece, Voice of	11645af	15150af		

FREQUENCIES

1900-2000	Anguilla,Caribbean Beacon	11775am			
1900-2000	Australia, Radio	6080as	7240pa	9500as	9580pa
		9660as	11880pa		
1900-2000 vl	Australia, VL8A Alice Spg	2310do			
1900-2000 vl	Australia, VL8K Katherine	2485do			
1900-2000 vl	Australia, VL8T Tent Crk	2325do			
1900-1920	Brazil, R Nacional Bras	15265va			
1900-2000	Canada, CFRX Toronto	6070do			
1900-2000	Canada, CFVP Calgary	6030do			
1900-2000	Canada, CHNX Halifax	6130do			
1900-2000	Canada, CKZN St John's	6160do			
1900-2000	Canada, CKZU Vancouver	6160do			
1900-2000	China, China Radio Intl	9440va	9600af	11515af	
1900-2000	Costa Rica,RF Peace Intl	15050am	21460am		
1900-2000	Ecuador, HCJB	17735eu	21455am		
1900-2000	Eqt Guinea, Radio Africa	15186af			
1900-1950	Germany, Deutsche Welle	9640af	9670af	11785af	11810af
		13790af	15245af	15390af	
1900-2000	Germany, Sunrise Radio	5850va			
1900-2000	Germany, Voice of Hope	6015eu			
1900-2000	Germany,Overcomer Ministr	3975eu	9800af	12055me	15625ne
1900-1910	Greece, Voice of	7515eu	9375eu		
1900-2000	Guatemala, Adv World R	5980am			
1900-1945	India, All India Radio	7410eu	9650af	9950eu	11620eu
		11935af	13780af	15075af	15200af
1900-2000	Ireland, Unt Christian BC	6200do			
1900-2000	Kenya, Kenya Broadc Corp	4885do	4935do		
1900-2000	Kuwait, Radio	11990am			
1900-2000	Lebanon, Voice of Hope	9960me			
1900-2000	Liberia, Radio Veritas	5470do			
1900-2000	Liberia, Star Radio	5880do			
1900-1915	Liberia,LCN/R Liberia Int	5100do			
1900-2000	Malaysia, Radio	7295do			
1900-2000	Netherlands, Radio	6020af	7120af	9895af	11655af
		15315af	17605af		
1900-1958	New Zealand, R NZ Intl	11675pa			
1900-2000	Nigeria, Voice of	7255af	15120af		
1900-2000	North Korea, R Pyongyang	6520va	9600va	9975af	
1900-2000 vl	Papua New Guinea, NBC	4890do			
1900-1930	Philippines, R Pilipinas	11720me	11890as	15190as	
1900-2000	Russia,Voice of Russia WS	7290eu	7350eu	7445af	9740eu
		9765eu	9775eu	9820eu	9895af
		11695af	11985af		
1900-2000	South Korea, R Korea Intl	5975as	7275as		
1900-2000	Sri Lanka, Sri Lanka BC	6005as			
1900-2000 a	Sri Lanka, Sri Lanka BC	6010eu			
1900-2000	Swaziland, Trans World R	3200af			
1900-2000 vl	Tanzania, Radio	5050do			
1900-2000	Thailand, Radio	7210eu	9655eu	11905eu	
1900-2000	UK, BBC African Service	3255af	6005af	6190af	9630af
		11835af	15400af	17830af	
1900-1930	UK, BBC Asian Service	5975as	9740pa		
1900-2000	Uk, BBC World Service	6180eu	6195eu	9410eu	12095eu
		15485eu			
1900-2000 w	UK, Merlin Network One	13690eu	15565na		
1900-2000	USA, Armed Forces Network	4278am	6458am	12689am	
1900-2000	USA, KAIJ Dallas TX	13815am			
1900-2000	USA, KJES Mesquite NM	15385am			
1900-2000	USA, KTBN Salt Lk City UT	15590am			
1900-2000	USA, Voice of America	6035af	7375af	7415af	9525pa
		9760af	11870pa	11975af	15180pa
		15410af	15445af	15580af	
1900-2000 s	USA, Voice of America	4950af			
1900-2000	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
1900-2000 mtwhfa	USA, WGTG McCaysville GA	9400am			
1900-2000	USA, WHRA Greenbush ME	17655af			
1900-2000	USA, WHRI Noblesville IN	9495am	13760am		
1900-2000	USA, WJCR Upton KY	7490na	13595na		
1900-2000	USA, WMLK Bethel PA	9465am			
1900-2000 mtwhf	USA, WRNO New Orleans LA	15420am			
1900-2000 tf	USA, WSHB Cypress Crk SC	15665eu			
1900-2000	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1900-2000	USA, WYFR Okeechobee FL	15695eu			
1900-1930	Vietnam, Voice of	9840eu	12020eu	15010eu	
1900-2000	Zambia, Christian Voice	3330af	4965af		
1900-2000	Zambia, Natl BC Corp	6165do	6265do		
1900-2000 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1905-1910	Croatia, Croatian Radio	5900eu			
1930-2000	Georgia, Radio	6230eu			
1930-2000	Iran, VOIRI	7160eu	7260eu	9022eu	
1930-2000	Serbia, Radio Yugoslavia	6100eu	9720af		
1930-2000	Slovakia, R Slovakia Intl	5920eu	6055eu	7345eu	
1930-2000 mtwfha	Sweden, Radio	6065eu			
1930-2000	Turkey, Voice of	9445eu	11765na		
1930-2000	Uganda, Radio	4976do			
1930-2000	UK, BBC Asian Service	9740pa			
1930-2000 mtwhfa	UK, BBC World Service	5975me			
1935-1955	Italy, RAI Intl	5970eu	7145eu	9760eu	
1945-2000 smthf	Germany, Universal Life	5890eu			
1956-2000	S Africa, Voice of Hope	6290af			

2000 UTC

2000-2100	Algeria, R Algiers Intl	11715af	11750af		
2000-2100	Anguilla,Caribbean Beacon	11775am			
2000-2100	Australia, Radio	7240pa	9500as	9580pa	9660as
		11880pa	12080as		
2000-2100 vl	Australia, VL8A Alice Spg	2310do			
2000-2100 vl	Australia, VL8K Katherine	2485do			
2000-2100 vl	Australia, VL8T Tent Crk	2325do			
2000-2100	Bulgaria, Radio	9700eu	11720eu		
2000-2100	Canada, CFRX Toronto	6070do			
2000-2100	Canada, CFVP Calgary	6030do			
2000-2100	Canada, CHNX Halifax	6130do			
2000-2100	Canada, CKZN St John's	6160do			
2000-2100	Canada, CKZU Vancouver	6160do			
2000-2059	Canada, R Canada Intl	5995va	7235va	11690va	13650va
		13670va	15150va	15325va	17820va
		17870va			
2000-2100	China, China Radio Intl	5220af	6950eu	7160af	9440af
		9920eu	11975af	15500va	
2000-2100	Costa Rica,RF Peace Intl	15050am	21460am		
2000-2027	Czech Rep, Radio Prague	5930eu	11600as		
2000-2100	Ecuador, HCJB	17735eu	21455am		
2000-2100	Eqt Guinea, Radio Africa	15186af			
2000-2030	Finland, YLE/R Finland	6135va			
2000-2100	Germany, R Voice ofCanada	15245am			
2000-2015 smthf	Germany, Universal Life	5890eu			
2000-2100	Germany, Voice of Hope	6015eu			
2000-2100	Germany,Overcomer Ministr	3975eu	12055me	15625na	
2000-2030	Ghana, Ghana Broadc Corp	3366do	4915do		
2000-2100	Guatemala, Adv World R	5980am			
2000-2030	Hungary, Radio Budapest	3975eu	7170eu		
2000-2100	Indonesia, Voice of	9525as	11765as	15510as	
2000-2100	Ireland, Unt Christian BC	6200do			
2000-2025	Israel, Kol Israel	9435eu	11605va	15640am	15650va
2000-2100	Kenya, Kenya Broadc Corp	4885do	4935do		
2000-2100	Kuwait, Radio	11990am			
2000-2030 a	Latvia, Radio Latvia Intl	5935eu			
2000-2100	Lebanon, Voice of Hope	9960me			
2000-2100 vl	Lesotho, Radio Lesotho	4800do			
2000-2100	Liberia, Radio Veritas	5470do			
2000-2055	Liberia,LCN/R Liberia Int	5100do			
2000-2100	Malaysia, Radio	7295do			
2000-2100 s	Malta, VO Mediterranean	12060eu			
2000-2030	Mexico, Radio Mexico Intl	5985na	9705na		
2000-2100 vl	Namibia, NBC	3270af	3289af		
2000-2025	Netherlands, Radio	6020af	7120af	9895af	11655af
		15315af	17605af		
2000-2100	New Zealand, R NZ Intl	17675pa			
2000-2015 vl	Niger, Voice du Sahel	5019do			
2000-2005	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2000-2100	Nigeria, Voice of	7255af	15120af		
2000-2100 vl	Papua New Guinea, NBC	4890do			
2000-2100	Russia,Voice of Russia WS	7290eu	7350eu	7440eu	7445af
		9440af	9740eu	9765eu	9775eu
		9820eu	9865eu	9895af	11695af
		11850af	11985af		
2000-2005	S Africa, Voice of Hope	6290af			
2000-2030	Serbia, Radio Yugoslavia	7230au			
2000-2015	Sierra Leone, SLBS	3316do			
2000-2100 mtwhf	Spain, R Exterior Espana	9855eu	11830af		
2000-2100	Sri Lanka, Sri Lanka BC	6005as			
2000-2015	Swaziland, Trans World R	3200af			
2000-2030	Switzerland, Swiss R Intl	6165eu	9840af	9885eu	9905af
		11725af			
2000-2100 vl	Tanzania, Radio	5050do			
2000-2030	Turkey, Voice of	9445eu	11765na		
2000-2015	Uganda, Radio	4976do			
2000-2100	UK, BBC African Service	3255af	6005af	6190af	9630af
		11835af	15400af	17830af	
2000-2100	UK, BBC Asian Service	5975pa	9740pa		
2000-2100	UK, BBC World Service	6180eu	6195eu	7325eu	9410eu
		12095sa			
2000-2100 w	UK, Merlin Network One	13690eu	15565na		
2000-2100	USA, Armed Forces Network	4278am	6458am	12689am	
2000-2100	USA, KAIJ Dallas TX	13815am			
2000-2100	USA, KTBN Salt Lk City UT	15590am			
2000-2100	USA, Voice of America	6035af	6095me	7375af	7415af
		9760af	9770af	11975af	15410af
		15445af	15580af	17725af	17755af
2000-2030	USA, Voice of America	4950af	11855af		
2000-2100	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
2000-2100 mtwhfa	USA, WGTG McCaysville GA	9400am			
2000-2100	USA, WHRA Greenbush ME	17655af			
2000-2100 mtwhf	USA, WHRI Noblesville IN	5745am			
2000-2100	USA, WHRI Noblesville IN	9495am			
2000-2100	USA, WJCR Upton KY	7490na	13595na		
2000-2100	USA, WMLK Bethel PA	9465am			
2000-2100 a	USA, WRMI/R Miami Intl	9955ca			
2000-2100 mtwhf	USA, WRNO New Orleans LA	15420am			
2000-2100 w	USA, WSHB Cypress Crk SC	13770eu			
2000-2100	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
2000-2100	USA, WYFR Okeechobee FL	11855na	15695eu	17555va	17845va
2000-2100	Zambia, Christian Voice	3330af	4965af		
2000-2100	Zambia, Natl BC Corp	6165do	6265do		
2000-2100 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
2005-2100	Syria, Radio Damascus	12085eu	13610na		
2010-2030	Vatican State, Vatican R	9660af	11625af	13765af	
2025-2045	Italy, RAI Intl	7170af	9710af	11800af	
2030-2100 th	Belarus, R Belarus Intl	7210eu	11960eu		
2030-2100	Cuba, Radio Havana	13720eu	13750eu		
2030-2100	Egypt, Radio Cairo	15375af			
2030-2100	Georgia, Radio	6230eu			
2030-2100	Germany, AWR Europe	9835af			
2030-2100 irreg	Iraq, Radio Iraq Intl	11785eu			
2030-2055	Moldova, R Moldova Intl	7520eu			
2030-2100	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	9525eu
2030-2100	S Africa, AWR Africa	9745af			
2030-2100 as	Sweden, Radio	6065eu	13830af		
2030-2045	Thailand, Radio	9655eu	9680eu	11905eu	
2030-2100 as	USA, Voice of America	4950af			
2030-2100	Uzbekistan, R Tashkent	9540eu	9545eu		
2030-2100	Vietnam, Voice of	9840eu	12020eu	15010eu	
2045-2100	India, All India Radio	7150pa	7410eu	9650eu	9910pa
		9950eu	11620va	11715pa	
2050-2100	Vatican State, Vatican R	4005eu	5883eu	7250eu	9645eu

FREQUENCIES

2100-2200	Anguilla,Caribbean Beacon	11775am			
2100-2200	Australia, Radio	7240as	9660pa	11880pa	12080as
		17715pa	21740pa		
2100-2130	Australia, Radio	9500as			
2100-2130 vl	Australia, VL8A Alice Spg	2310do			
2100-2130 vl	Australia, VL8K Katherine	2485do			
2100-2200 vl	Australia, VL8K Katherine	5025do			
2100-2130 vl	Australia, VL8T Tent Crk	2325do			
2100-2200 vl	Australia, VL8T Tent Crk	4910do			
2100-2115 vl	Cameroon, Radio Cameroon	4850do			
2100-2200 vl	Canada, CBC N Quebec Svc	9625do			
2100-2200	Canada, CFRX Toronto	6070do			
2100-2200	Canada, CFVP Calgary	6030do			
2100-2200	Canada, CHNX Halifax	6130do			
2100-2200	Canada, CKZN St John's	6160do			
2100-2200	Canada, CKZU Vancouver	6160do			
2100-2129	Canada, R Canada Intl	7235va	11690va	11890va	13650va
		13670va	15150va	15325va	17820va
2100-2130	China, China Radio Intl	11975af	15500va		
2100-2200	China, China Radio Intl	6950eu	7180af	9535as	9920eu
2100-2200	Costa Rica,RF Peace Intl	15050am	21460am		
2100-2130	Cuba, Radio Havana	13720eu	13750eu		
2100-2200	Ecuador, HCJB	17735eu	21455am		
2100-2200	Egypt, Radio Cairo	15375af			
2100-2200	Eqt Guinea, Radio Africa	15186af			
2100-2150	Germany, Deutsche Welle	7115as	9615eu	9670as	9735af
		9765as	11785as	11865af	15135va
2100-2200	Germany, R Voice ofCanada	15245am			
2100-2200	Germany, Voice of Hope	6015eu			
2100-2200	Germany,Overcomer Ministr	3975eu	9510as	11625sa	12050sa
2100-2200	India, All India Radio	7150pa	7410eu	9650eu	9910pa
		9950eu	11620va	11715pa	
2100-2200 irreg	Iraq, Radio Iraq Intl	11785eu			
2100-2200	Ireland, Unt Christian BC	6200do			
2100-2200 fas/vl	Italy, IRRS	3955va			
2100-2200	Japan, R Japan/NHK World	6035pa	9725eu	11850pa	13630na
2100-2200 vl	Lesotho, Radio Lesotho	4800do			
2100-2200	Liberia, Radio Veritas	5470do			
2100-2115	Liberia,LCN/R Liberia Int	5100do			
2100-2200	Malaysia, Radio	7295do			
2100-2130 smthf	Mexico, Radio Mexico Intl	5985na	9705na		
2100-2200 vl	Namibia, NBC	3270af	3289af		
2100-2200	New Zealand, R NZ Intl	17675pa			
2100-2200	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2100-2200	North Korea, R Pyongyang	4405as	6575eu	9335eu	11710am
		13760am			
2100-2200 vl	Papua New Guinea, NBC	4890do			
2100-2125	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	9525eu
2100-2200	Romania, R Romania Intl	7105eu	9550eu	9690eu	
2100-2200	Russia,Voice of Russia WS	7350eu	9440af	9710eu	9765eu
		9775eu	9820eu	11675eu	11850af
		11930eu	11980eu		
2100-2130	South Korea, R Korea Intl	3970eu	6480eu		
2100-2200	South Korea, R Korea Intl	15575eu			
2100-2200 as	Spain, R Exterior Espana	9855eu	11830af		
2100-2130	Sri Lanka, Sri Lanka BC	6005as			
2100-2130	Switzerland, Swiss R Intl	3985eu			
2100-2200	Syria, Radio Damascus	12085na	13610na		
2100-2200 vl	Tanzania, Radio	5050do			
2100-2110	Uganda, Radio	4976do			
2100-2200	UK, BBC African Service	3255af	6005af	6190af	11835af
2100-2200	UK, BBC Asian Service	3915as	5965as	5975pa	6195as
		9740pa	11945as		
2100-2200	UK, BBC World Service	5975am	6180eu	6195eu	7325eu
		9410eu	12095sa		
2100-2200 w	UK, Merlin Network One	11915eu	11985eu	13690va	
2100-2200	USA, Armed Forces Network	4278am	6458am	12689am	
2100-2200	USA, KAIJ Dallas TX	13815am			
2100-2200	USA, KJES Mesquite NM	15385am			
2100-2200	USA, KTBN Salt Lk City UT	15590am			
2100-2200	USA, Voice of America	6035af	6095me	7375af	7415af
		9535af	9760eu	11870pa	11975af
		15185as	15410af	15445af	15580af
		17725af	17735as		
2100-2200	USA, WEWN Birmingham AL	11875na	13615na	15745eu	
2100-2200 mtwhfa	USA, WGTG McCaysville GA	9400am			
2100-2200	USA, WHRA Greenbush ME	15460af			
2100-2200	USA, WHRI Noblesville IN	9495am	13760am		
2100-2200	USA, WINB Red Lion PA	13790am			
2100-2200	USA, WJCR Upton KY	7490na	13595na		
2100-2200	USA, WMLK Bethel PA	9465am			
2100-2200	USA, WRNO New Orleans LA	15420am			
2100-2200 mwa	USA, WSHB Cypress Crk SC	11550eu			
2100-2200	USA, WWCR Nashville TN	5070am	9475am	13845am	15685am
2100-2200	USA, WYFR Okeechobee FL	11855na	15215va	15695va	17845va
2100-2110	Vatican State, Vatican R	4005eu	5883eu	7250eu	9645eu
2100-2200	Zambia, Christian Voice	3330af	4965af		
2100-2200	Zambia, Natl BC Corp	6165do	6265do		
2100-2200 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
2115-2200	Egypt, Radio Cairo	9900eu			
2115-2130	Iran, VOIRI	6175au	9685ca		
2115-2130 mtwhf	UK, BBC Caribbean Report	5975ca	15390ca	17715ca	
2115-2130 as	UK, BBC World Service	5975am			
2130-2200	Austria, R Austria Intl	5945eu	6155eu	13730va	
2130-2200 th	Belarus, R Belarus Intl	7210eu	11960eu		
2130-2157	Czech Rep, Radio Prague	11600va			
2130-2200	Ghana, Ghana Broadc Corp	3366do			
2130-2200	Guam, AWR/KSDA	15310as			
2130-2135 mtwhf	Latvia, Radio Latvia Intl	5935eu			
2130-2155	Moldova, R Moldova Intl	7520eu			
2130-2200 as	Sweden, Radio	6065eu	9430af		
2130-2200	Turkey, Voice of	7210as			
2130-2145 t f	UK, BBC Calling Falklands	11680sa			
2130-2200	USA, Voice of America	6040me	6095me	9535af	9760eu
		11870pa	15185as	17735as	
2130-2200 smtwhf	USA, Voice of America	6035af	7375af	7415af	11975af
		15410af	15445af	15580af	17725af
2130-2200	Uzbekistan, R Tashkent	9540eu	9545eu		

2200 UTC

2200-2300	Anguilla,Caribbean Beacon	11775am			
2200-2300	Australia, Radio	12080as	17715pa	17795pa	21740pa
2200-2300 vl	Australia, VL8K Katherine	5025do			
2200-2300 vl	Australia, VL8T Tent Crk	4910do			
2200-2300	Bulgaria, Radio	9700eu	11720eu		
2200-2300	Canada, CBC N Quebec Svc	9625do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2229	Canada, R Canada Intl	5960am	9755am	11705as	13670am
		15305am			
2200-2300	China, China Radio Intl	9880eu			
2200-2230	China, China Radio Intl	3985eu			
2200-2300	Costa Rica,RF Peace Intl	15050am	21460am		
2200-2245	Egypt, Radio Cairo	9900eu			
2200-2300	Eqt Guinea, Radio Africa	15186af			
2200-2300	Germany,Overcomer Ministr	3975eu	9510as	11625sa	11925sa
		12050sa			
2200-2215	Ghana, Ghana Broadc Corp	4915do			
2200-2230	Hungary, Radio Budapest	3975eu	11700eu		
2200-2230	India, All India Radio	7150pa	7410eu	9650eu	9910pa
		9950eu	11620va	11715pa	
2200-2230	Iran, VOIRI	6025au	6175au		
2200-2300 irreg	Iraq, Radio Iraq Intl	11785eu			
2200-2300	Ireland, Unt Christian BC	6200do			
2200-2300 fas/vl	Italy, IRRS	3955va			
2200-2225	Italy, RAI Intl	6150pa	9675pa	11900as	
2200-2215	Liberia,LCN/R Liberia Int	5100do			
2200-2300	Malaysia, Radio	7295do			
2200-2300 vl	Namibia, NBC	3270af	3289af		
2200-2300 smtwh	New Zealand, R NZ Intl	17675pa			
2200-2215	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2200-2300 vl	Papua New Guinea, NBC	9675do			
2200-2230	Serbia, Radio Yugoslavia	6100eu	6185eu		
2200-2215	Sierra Leone, SLBS	3316do			
2200-2205	Syria, Radio Damascus	12085na	13610na		
2200-2300	Taiwan, Radio Taipei Intl	15600eu	17750eu		
2200-2230	Turkey, Voice of	7210as			
2200-2300	UK, BBC African Service	11835af	15400af		
2200-2300	UK, BBC Asian Service	5965as	6195as	7110as	9660as
		9890as	11955as	12080ps	
2200-2300	UK, BBC World Service	5975am	6175na	6195na	7325eu
		9410eu	9590am	9915sa	12095sa
2200-2300 w	UK, Merlin Network One	9645eu	9780na	11915eu	11985na
		13690na			
2200-2300	Ukraine, R Ukraine Intl	5905eu	6020eu	6080eu	7180eu
		7240eu	7380eu	7410eu	9550na
		9560eu	12040na	13590eu	
2200-2300	USA, Armed Forces Network	4278am	6458am	12689am	
2200-2300	USA, KAIJ Dallas TX	13815am			
2200-2300	USA, KTBN Salt Lk City UT	15590am			
2200-2300	USA, Voice of America	7215as	9705as	9770as	11760as
		15185as	15290as	15305as	17735as
		17820as			
2200-2230 mtwhf	USA, Voice of America	6035af	7340af	7375af	7415af
		11975af			
2200-2300	USA, WBCQ Monticello ME	7415na			
2200-2300	USA, WEWN Birmingham AL	5825na	13615na	15745eu	
2200-2300 mtwhfa	USA, WGTG McCaysville GA	9400am			
2200-2300	USA, WHRA Greenbush ME	15460af			
2200-2300	USA, WHRI Noblesville IN	5745am	9495am		
2200-2300	USA, WINB Red Lion PA	13790am			
2200-2300	USA, WJCR Upton KY	7490na	13595na		
2200-2300 as	USA, WRMI/R Miami Intl	9955ca			
2200-2300	USA, WRNO New Orleans LA	15240am			
2200-2300 h	USA, WSHB Cypress Crk SC	11550eu			
2200-2300 w	USA, WSHB Cypress Crk SC	15285sa			
2200-2300	USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
2200-2300	USA, WYFR Okeechobee FL	11855na	15215va	17845va	
2200-2210	Zambia, Natl BC Corp	6165do	6265do		
2230-2300	Albania, R Tirana Intl	6025eu	7165eu		
2230-2300	Canada, R Canada Intl	5960am	9755am	13670am	
2230-2300	Cuba, Radio Havana	9550am			
2230-2257	Czech Rep, Radio Prague	9435na	11600na		
2230-2300	UK, BBC World Service	5975am	6175na	9590na	9915sa
		12095sa			
2240-2250	Greece, Voice of	9420au	11645au		
2245-2300	Ghana, Ghana Broadc Corp	3366do	4915do		
2245-2300	India, All India Radio	7410as	9705as	9950as	11620as
2245-2300	Vatican State, Vatican R	7305au	9600au	11830au	

Frequencies

2300-0000	Anguilla,Caribbean Beacon	6090am			
2300-0000	Australia, Radio	9660pa	12080as	17715pa	17795pa
		21740pa			
2300-0000 vl	Australia, VL8K Katherine	5025do			
2300-0000 vl	Australia, VL8T Tent Crk	4910do			
2300-0000	Canada, CBC N Quebec Svc	9625do			
2300-0000	Canada, CFRX Toronto	6070do			
2300-0000	Canada, CFVP Calgary	6030do			
2300-0000	Canada, CHNX Halifax	6130do			
2300-0000	Canada, CKZN St John's	6160do			
2300-0000	Canada, CKZU Vancouver	6160do			
2300-2329	Canada, R Canada Intl	5960am	9755am	11895am	13670am
		15305am			
2300-0000	Costa Rica,RF Peace Intl	15050am	21460am		
2300-2330	Cuba, Radio Havana	9550am			
2300-0000	Egypt, Radio Cairo	9900am			
2300-2350	Germany, Deutsche Welle	5975as	6090as	7235as	9690as
2300-0000 s	Germany,Good News World R	9640eu			
2300-0000	Germany,Overcomer Ministr	3975eu	9510as	11625sa	12050sa
2300-0000	Ghana, Ghana Broadc Corp	4915af			
2300-2330 as	Guam, AWR/KSDA	11775as			
2300-0000 mtwhf	Guam, AWR/KSDA	11775as			
2300-0000	India, All India Radio	7410as	9705as	9950as	11620as
2300-0000	Ireland, Unt Christian BC	6200do			
2300-2315	Liberia,LCN/R Liberia Int	5100do			
2300-0000	Malaysia, Radio	7295do			
2300-0000 vl	Namibia, NBC	3270af	3289af		
2300-0000 smtwh	New Zealand, R NZ Intl	17675pa			
2300-2315	Nigeria, FRCN/Radio	3326do	4770do	4990do	
2300-0000	North Korea, R Pyongyang	11335am	13760am	15130am	
2300-0000 vl	Papua New Guinea, NBC	9675do			
2300-0000	Romania, R Romania Intl	6130eu	7195eu	9570na	11830na
2300-0000	Singapore,RCorp Singapore	6150do			
2300-0000	Turkey, Voice of	7190eu	9655na		
2300-0000	UK, BBC Asian Service	3915as	5965as	6035as	6195as
		7110as	11945as	11955as	17790as
2300-0000	UK, BBC World Service	5975am	6175na	9590na	9915sa
		12095sa			
2300-0000 w	UK, Merlin Network One	3955eu	7170na	9645eu	9780na
		11985na	13690na		
2300-0000	USA, Armed Forces Network	4278am	6458am	12689am	
2300-0000	USA, KAIJ Dallas TX	13815am			
2300-0000	USA, KTBN Salt Lk City UT	15590am			
2300-0000	USA, Voice of America	7215as	9705as	9770as	11760as
		15185as	15290as	15305as	17735as
		17820as			
2300-0000	USA, WBCQ Monticello ME	7415na			
2300-0000	USA, WEWN Birmingham AL	5825na	9975eu	13615na	
2300-0000 mtwhfa	USA, WGTG McCaysville GA	9400am			
2300-0000	USA, WHRA Greenbush ME	15460af			
2300-0000	USA, WHRI Noblesville IN	13760am			
2300-0000	USA, WINB Red Lion PA	13790am			
2300-0000	USA, WJCR Upton KY	7490na	13595na		
2300-0000 s	USA, WRMI/R Miami Intl	9955ca			
2300-0000 w	USA, WSHB Cypress Crk SC	11550af			
2300-0000 m	USA, WSHB Cypress Crk SC	15285sa			
2300-0000	USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
2300-0000	USA, WYFR Okeechobee FL	11855na			
2300-2315	Vatican State, Vatican R	7305au	9600au	11830au	
2329-2359 as	Canada, R Canada Intl	11895am	15305am		
2329-2359	Canada, R Canada Intl	5960am	9755am	13670am	
2330-0000	Netherlands, Radio	6020na	6165na	9845na	
2330-0000	Vietnam, Voice of	9840eu	12020eu	15010eu	
2335-2345	Greece, Voice of	9395sa	9425sa	11595sa	11645sa
2335-2345	Sierra Leone, SLBS	3316do			
2345-0000 mtwhf	UK, BBC Asian Service	3915as			

Selected Programs

Sundays

2300 Australia, Radio: RA News. See S 0000.
2300 Guam, AWR/KSDA: Wavescan. A program for DXers and shortwave listeners produced at AWR's British studio.
2300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
2310 Australia, Radio: Asia Pacific. News and analysis from across the Pacific and Asia with Di Martin.
2320 Guam, AWR/KSDA: Pacific Island Journal. News and stories about the Pacific Islands.
2330 Australia, Radio: Correspondents' Report. See S 0030.

Mondays

2300 Australia, Radio: RA News. See S 0000.
2300 Guam, AWR/KSDA: Sounds of Inspiration. An adult Christian music program.
2300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
2310 Australia, Radio: Asia Pacific. See S 2310.
2315 Guam, AWR/KSDA: Discovering the Bible. Recitation of scripture in story form.
2330 Australia, Radio: Innovations. See S 0230.
2330 Guam, AWR/KSDA: The Bible in Living Sound. A dramatic look at the bible.
2345 Guam, AWR/KSDA: Voice of Prophecy. Write for an adult bible study program.

Tuesdays

2300 Australia, Radio: RA News. See S 0000.
2300 Guam, AWR/KSDA: Sounds of Inspiration. See M 2300.
2300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
2310 Australia, Radio: Asia Pacific. See S 2310.
2315 Guam, AWR/KSDA: Discovering the Bible. See M 2315.
2330 Australia, Radio: Arts Australia. Lisa Harris presents reviews and comment on current events within the Australian arts scene.
2330 Guam, AWR/KSDA: The Bible in Living Sound. See M 2330.
2345 Guam, AWR/KSDA: Voice of Prophecy. See M 2345.

Wednesdays

2300 Australia, Radio: RA News. See S 0000.
2300 Guam, AWR/KSDA: Sounds of Inspiration. See M 2300.
2300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
2310 Australia, Radio: Asia Pacific. See S 2310.
2315 Guam, AWR/KSDA: Discovering the Bible. See M 2315.
2330 Australia, Radio: Rural Reporter. No information available.
2330 Guam, AWR/KSDA: The Bible in Living Sound. See M 2330.
2345 Guam, AWR/KSDA: Voice of Prophecy. See M 2345.

Thursdays

2300 Australia, Radio: RA News. See S 0000.
2300 Guam, AWR/KSDA: Sounds of Inspiration. See M 2300.
2300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
2310 Australia, Radio: Asia Pacific. See S 2310.
2315 Guam, AWR/KSDA: Discovering the Bible. See M 2315.
2330 Australia, Radio: Media Report. See H 0030.
2330 Guam, AWR/KSDA: The Bible in Living Sound. See M 2330.
2345 Guam, AWR/KSDA: Voice of Prophecy. See M 2345.

Fridays

2300 Australia, Radio: RA News. See S 0000.
2300 Guam, AWR/KSDA: Sounds of Inspiration. See M 2300.
2300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
2305 Australia, Radio: Book Reading. Serialized readings of the best Australian novels.
2315 Guam, AWR/KSDA: Discovering the Bible. See M 2315.
2330 Australia, Radio: Pacific Review. See S 0530.
2330 Guam, AWR/KSDA: The Bible in Living Sound. See M 2330.
2345 Guam, AWR/KSDA: Voice of Prophecy. See M 2345.

Saturdays

2300 Australia, Radio: RA News. See S 0000.
2300 Guam, AWR/KSDA: Wavescan. See S 2300.
2300 USA, KAIJ (Dallas TX): World University Network (Dr. Gene Scott).
2310 Australia, Radio: Australia All Over. Join listeners across the island continent as Ian McNamara throws the spotlight on life in Australia.
2315 Guam, AWR/KSDA: Pacific Island Journal. See S 2320.

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Thank You...

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PROPAGATION CONDITIONS, U.S.

OPTIMIZE YOUR MONITORING

Jacques d'Avignon
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Where To Listen On The Bands

As the DX conditions are greatly improving with a marked increase in the MUF (Maximum Usable Frequency) and in parallel the OWF (Optimum Working Frequency), the various SW broadcasters will now have a greater number of frequencies to use for their transmissions. One direct consequence of this situation is that the broadcasters will now migrate from the lower frequencies — the 49 and 41 meter bands where they were all piling up — to higher frequencies, especially at night.

We have to remember that there are many frequency bands that are available to the broadcasters. Depending on the time of day at the transmitter and at the target area, what time of the year and other factors, broadcasters may choose from a number of frequencies to carry their signals. You will find below a listing of these frequencies and what is the best time of the day to listen to if you live in North America. Even if the propagation forecasts do not seem to indicate that the upper frequencies will be open, give them a try; you never know what is really up there!

Experiment and good DX!

METER BAND	FREQUENCY MHz	WHAT CAN BE HEARD IN NORTH AMERICA
120	2.300-2.495	Tropical domestic. Some Australian stations can be heard at times in North America if you are located in a very RF quiet environment.
90	3.200-3.400	Tropical domestic. African stations can also be heard late afternoon when the noise level is low. WWCR can be heard on 3.215 MHz, this is an unusual frequency allocation for a station broadcasting from North America.
75	3.900-4.000	Used for "domestic" broadcast in Europe and the Pacific/Asia. BBC and other stations transmitting to and within Europe can be heard late at night or early morning in North America.
60	4.750-5.060	Tropical domestic. South and Central America can be heard at night and early morning. Very good signal in North America in early morning.
49	5.900-6.200	Good international evening band. Heavy use of this band when solar flux is low, major congestion
41	7.100-7.350	Very good evening band. This band not normally used to transmit from North America. It is used extensively in Europe for transmission to North and South America specially late afternoon and at night.
31	9.400-9.900	Good all around-the-clock band. Depending of the time of day, you can hear signals from Europe and/or Asia.
25	11.600-12.100	Excellent band for mid-day listening.
22	13.570-13.870	This band has not yet been approved "officially" for broadcasting, but many countries are using it extensively. Good daytime band.
19	15.100-15.800	Good old daytime reliable band. Most SWLs have had their first experience in listening to foreign stations in this band. Signals of good quality can at times be heard at night.
16	17.480-17.900	This also a good daytime band, but not used as much as the 19 meter band.
15	18.900-19.020	Good morning and early daytime band. One of the new band for the broadcasters. Not much used at present.
13	21.450-21.780	Good morning and early daytime band, also signal from Australia and area heard around 0500 UTC, when the solar flux is mid to high.
11	25.670-26.100	Early daytime band when the propagation conditions are very good, i.e., when the sunspot numbers are high. Has a very limited use at other times

OPTIMUM WORKING FREQUENCIES (MHz)

For the Period 15 November to 14 December 1998 Flux=154 SSN=116

Predictions prepared using ASAPS for Windows®

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TO/FROM US WEST COAST																								
SOUTH AMERICA	26	23	19	16	15	13	12	12	12	11	11	10	10	11	18	27	30	31	30	29	29	28	28	28
WESTERN EUROPE	10	10	10	10	9	9	9	9	10	10	9	9	9	*	12	18	23	25	22	19	15	13	12	11
EASTERN EUROPE (P)	9	9	9	9	9	10	11	10	10	10	10	10	10	10	11	14	17	14	12	*	*	*	*	9
MEDITERRANEAN	15	14	14	14	13	13	12	12	12	12	*	*	*	*	14	20	24	23	20	19	17	16	15	14
MIDDLE EAST (P)	11	11	11	13	14	12	11	*	*	*	*	*	10	10	10	13	15	13	12	11	*	11	11	11
CENTRAL AFRICA	22	21	19	16	13	13	12	12	*	*	*	*	*	*	18	26	25	25	23	21	22	23	25	23
SOUTH AFRICA	20	18	17	14	13	12	12	*	*	*	*	*	*	*	20	25	25	25	24	24	23	22	22	21
SOUTH EAST ASIA (P)	26	29	26	20	17	*	*	*	*	*	10	10	10	10	10	10	15	19	17	16	14	12	*	14
FAR EAST	29	27	24	19	16	13	11	10	10	10	10	10	9	9	9	10	10	10	10	*	11	17	25	29
AUSTRALIA	23	24	25	23	19	17	15	14	13	13	12	12	11	10	10	12	18	17	17	18	20	21	22	22
TO/FROM US MIDWEST																								
SOUTH AMERICA	23	18	15	14	13	12	11	11	11	10	10	9	10	15	24	28	28	28	27	26	26	26	26	26
WESTERN EUROPE	12	12	12	11	11	11	11	11	11	12	12	11	12	15	22	27	30	29	26	23	19	16	14	13
EASTERN EUROPE	8	8	8	8	9	9	11	11	11	11	11	11	11	12	16	22	18	15	12	*	*	*	8	8
MEDITERRANEAN	15	14	14	14	13	12	13	12	12	12	*	*	*	15	22	27	29	25	22	20	18	16	16	15
MIDDLE EAST (P)	11	11	11	12	13	12	12	12	*	*	*	11	11	12	15	19	17	14	12	12	12	12	12	11
CENTRAL AFRICA	22	20	16	14	13	13	13	13	*	*	*	*	*	18	26	26	26	25	23	22	22	24	25	24
SOUTH AFRICA	20	18	16	14	13	12	12	*	*	*	*	*	*	20	26	25	25	25	24	24	23	22	22	21
SOUTH EAST ASIA (P)	24	25	20	16	13	*	*	*	*	*	10	10	10	10	11	15	18	17	16	14	13	12	11	13
FAR EAST	29	26	21	17	14	12	11	10	10	10	10	10	10	10	11	11	11	11	*	*	11	17	26	30
AUSTRALIA	23	24	22	19	16	14	13	12	12	12	11	11	10	10	12	19	18	17	17	18	20	21	22	22
TO/FROM US EAST COAST																								
SOUTH AMERICA	16	14	13	12	11	11	11	10	9	9	8	10	16	23	26	26	26	25	25	24	23	23	23	20
WESTERN EUROPE	11	11	10	10	10	10	10	9	10	11	10	12	18	24	28	28	28	27	24	21	17	15	13	12
EASTERN EUROPE	9	9	8	8	9	9	11	11	11	11	10	11	15	21	26	23	19	15	12	10	10	9	9	9
MEDITERRANEAN	15	14	13	13	12	11	12	12	12	11	*	13	20	26	29	29	28	25	22	19	18	17	16	16
MIDDLE EAST (P)	12	12	12	12	13	13	12	12	12	12	12	12	17	23	25	21	18	16	14	13	13	12	12	12
CENTRAL AFRICA	19	17	15	15	14	14	13	13	*	*	*	19	25	26	26	27	27	26	24	22	22	24	25	22
SOUTH AFRICA	19	17	15	14	13	14	13	13	*	*	*	17	26	26	26	25	25	25	24	24	23	22	22	21
SOUTH EAST ASIA (P)	19	18	16	14	13	*	*	*	*	12	12	12	12	16	22	21	17	15	15	14	13	12	11	12
FAR EAST	24	20	18	15	14	13	13	12	12	12	12	11	12	12	12	12	11	11	*	11	12	16	24	27
AUSTRALIA	23	21	17	*	*	*	*	12	12	11	11	11	10	15	20	19	17	17	16	18	20	21	21	22

* *Unfavorable conditions: Search around the last listed frequency for activity.*

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Tracking the Global Economy

With the recent turmoil in global financial markets, the world's attention is focused on business and economics like never before. Not all that long ago, such information was deemed too technical for the mainstream and consigned to the business pages of newspapers and specialized publications with names like *Barron's*. But, over time, both the public's appetite and acumen have grown with the realization that the markets are a major factor in determining how people live their lives.

Indeed, the emergence of new market economies in Asia, central Europe and the former states of the Soviet Union — combined with the growing interdependence of what historically had been primarily "national" economies — have made business an "around the clock" global phenomenon.

There are numerous well-produced programs on shortwave focusing on business, finance and economic development from a range of perspectives. This month's column offers a snapshot of these. Please note that every station almost without exception includes some degree of business and financial news within its regular newscasts. [Consult *MT*'s "Shortwave Guide" section for frequencies and abbreviations.]

Daily Synopses

World Business Report (BBC) - Analyzes the day's main financial and economic news in a no-nonsense format. (Americas/Europe stream M-F 1205, 1630, 2105; T-A 0305, 0905; Africa stream M-F 0905, 1205, 2105; T-A 0305; Asia/Pacific stream 0905, 1205, 1705, 2105, 2230)

Business and Economic News (Voice of America) - An hourly three-minute check of global business. (49 minutes past most hours seven days a week on VOA News Now.)

Pacific Money Update (Radio New Zealand International - RNZI) - A report on currency trading in the Asia-Pacific region. (S-H 1959)

Pacific Business Report (RNZI) - Asia-Pacific region business news. (S-H 1935, 2055)

Business News (RNZI) - Daily report on New Zealand markets and business developments (M-F 0015)

Business and Market Report (Radio Singapore International - RSI) - Business and financial news focused on Singapore and Asia. (M-F 1109, 1230)

Weekly Magazines and Reviews

Global Business (BBC) - A top-notch half-hour with interviews, features and discussions about the international business community. (Americas/Europe stream S 0430,1030; Africa stream S 0915, 2105; Asia/Pacific stream S 0330, 1830)

Marks and Markets (Deutsche Welle - DW) - A magazine examining global business developments from a German and European perspective. (A 0915; S 0515; M 0215, 0415, 0615)

World Business Review (BBC) - The global business week in review. (Americas/Europe stream and Africa stream A 0905, 1205, 2105, S 0305; Asia/Pacific stream A 1205, 1705, 2105)

Around the World

Money Focus (BBC) - Magazine on African business matters. (T 1615)

ECOWAS Today (Voice of Nigeria - VON) - A weekly assessment of West African economic cooperation. (W 1645; A 1015)

Trading Post (RNZI) - NZ's overseas trade. (T 2115)

Trade Winds (RNZI) - Commerce between New Zealand and the Pacific nations. (H 1735)

On the Export Front (All India Radio - AIR) - Reports on Indian international trade. (A 1030, 1425, 1910, 2215; M 0005)

Open Windows (China Radio International - CRI) - Reports on foreign investment in China (approximately 30 past the hour in all transmissions beginning with M 1200 broadcast and the 0300, 0400, 0500, 0900 and 1000 broadcasts)

Vietnam's Economy (Voice of Vietnam) - Reports on Vietnamese business, investment and development. (H 15 minutes into all transmissions except on F in the 0100, 0130 and 0230 tranmissions)

Koreans at Work (Radio Korea International) - (M 1145, 1245, 1645, 1945, 2145, 2215; T 0245, 0845)

Currencies (RSI) - A weekly report on regional currency movements. (A1225, S 1255)

Business World (RSI) - Business and financial trends in Singapore and Asia. (A 1145, S 1115, M 1245)

Studio 9 Report on Business in Latin America and the Caribbean (HCJB) - (H 0710, 0910, 1910; F 0110, 0410)

Venture Canada (Radio Canada International) - Canadian business magazine. (A 1335, 1435, 1635, 2110; S 0205, 0405)

Business Week (Polish Radio Warsaw) - A report on Poland's economy. (F 1320, 1820, 2050)

Economic Report (Radio Prague) - Czech business and finance. (H ten minutes into all transmissions except on F in the 0000, 0100 and 0300 transmissions)

Newmarket (Voice of Russia) - A look at business and investment in Russia and the Commonwealth of Independent States. (M 1711; T 1511, 2011; W 0311, 0711, 2011; H 0511, 0911, 1711; F 1511, 2011; A 0311, 0711, 1611, 2111)

Money Matters (Radio Sweden) - Examines the Nordic economies. (W 15 minutes into all transmissions, except H in the 0130, 0230 and 0330 transmissions)

Bottom Line (Radio France International) - French business and its relationships with Europe. (W 1640; H 1234, 1434, 1720)

Economics (Radio Vlaanderen Internationaal) - A weekly brief on Belgian and European business, industry and markets. (H 1643, 1743, 2243; F 0743)

Economic Development Matters

This is a topic which clearly belongs within the realm of business and financial matters, but is not usually placed there. The problems of poverty and economic underdevelopment in our world are intertwined with the workings of the global economic system and should be seen in that context.

A Good Life (Radio Netherlands) - The best and most encompassing program about economic development bar none, A Good Life makes no assumptions about economic development efforts. It examines the motives, methods and consequences of development efforts, for better and for worse, on both societies and on individuals. This program really puts a human face on a topic that is usually drowned by statistics into meaninglessness. (T 0853, 1053, 1453, 1853, 2353; W 0153; F 0753, 0953, 1153, 1353, 1753, 1953; A 0053, 0253, 0453)

Other notable programs on this aspect of business and finance include:

Development Forum (DW) - (M 0930, 2130, 2330)

Report from Developing Countries (CRI) - (approximately 25 minutes into all transmissions beginning S 1200 continuing through M at 0300, 0400, 0500, 0900, 1000)

Until December, good listening!

AUDIO SUBCARRIERS

By Robert Smathers

An audio sub-carrier requires the presence of a video carrier to exist. If you take away the video carrier, the audio sub-carrier disappears as well. Most TVRO satellite receivers can tune in audio subcarriers and they can be found in the range from 5.0 to 9.0 MHz in the video carrier.

Audio frequencies in MHz, all satellites/transponder coordinates are C-band unless otherwise noted. DS=Discrete Stereo, N=Narrowband, W=Wideband

Classical Music

SuperAudio–Classical Collections	G5, 21	6.30/6.48 (DS)
WFMT-FM (98.7) Chicago, IL–Fine Arts	G5, 7	6.30/6.48 (DS)
WQXR-FM (96.3) New York, NY	S4, 14	6.20/6.80 (DS)

Satellite Computer Services

Superguide	G5, 7	5.48

Contemporary Music

KOCY-FM (105.3) Hoxie, Arkansas	G6, 6	8.50
Radio Desjardins 1	T5, 14	6.80
Radio Desjardins 2	T5, 14	6.20
SuperAudio–*Light and Lively Rock*	G5, 21	5.96, 6.12 (DS)
WBES-FM (94.5) Charleston, WV	GE1, 12	5.85
WPHZ-FM (96.9) Bremen, IN (South Bend market)	G6, 15	6.48, 7.30 (DS)

Country Music

SuperAudio–*American Country Favorites*	G5, 21	5.04/7.74 (DS)
WSM-AM (650) Nashville, TN	C4, 24	7.38, 7.56

Easy Listening Music

IAM Radio-easy listening music	G6, 6	7.69
SuperAudio–*Soft Sounds*	G5, 21	5.58/5.76 (DS)
FCC mandated safe-harbor program audio-easy listening music	G3R, 9	6.80
	G5, 2	6.80
United Video–easy listening music	C4, 8	5.895 (N)

Foreign Language Programming

Antenna Radio (Greek)	S4, 14	7.80
Apna Sangeet Radio India	GE1, 16	7.38
Arab Network of America radio network	GE2, 22	5.80
La Cadena CNN Radio Noticias (CNN Radio News in Spanish)	G5, 17	7.56
KAZN-AM (1300) Pasadena, CA–Radio Chinese (Ch.)	GE1, 22 (Ku-band)	5.80
Radio Maryja–religious programming (Poland)	G7, 10	8.00
Radio Maria – religious programming (Italian)	G7, 10	5.80
Radio Tropical	GE1, 4	7.60
SRC AM Network	E2, 1	7.38
SRC FM Network	E2, 1	5.41/5.58 (DS)
Unidentified Los Angeles area ethnic radio station	GE-1, 22 (Ku-band)	7.78
WCRP-FM (88.1) Guyama, PR–religious (Sp.)	G6, 6	6.53
XEX-AM (101.7) "Vox FM" Mexico City, Mexico (Sp.)	SD2, 7	7.38

Jazz Music

KLON-FM (88.1) Long Beach, CA., ID-*Jazz-88*	G5, 2	5.58/5.76 (DS)
Superaudio–*New Age of Jazz*	G5, 21	7.38/7.56 (DS)

News and Information Programming

Broadcast News	E2, 1	5.78
Business News Network	C4, 10	8.06 (N)
Cable Radio Network	G5, 2	7.24 (N)
	C1, 21	7.30
CNN Headline News	G5, 22	7.58
CNN Radio News	GE3, 9	5.62
	G5, 5	7.58
	G5, 22	6.30
USA Radio Network–news, talk and information	GE3, 13	5.01 , 5.20
WCBS-AM (880) New York, NY–news	G7, 19	7.38
WCCO-AM (830) Minneapolis, MN	GE3, 6	6.20

Religious Programming

Ambassasor Inspirational Radio	GE3, 15	5.96, 6.48
Brother Staire Radio	G5, 6	6.48
KHCB-FM (105.7) Houston, TX	C1, 10	7.28
LDS Radio Network	C1, 6	5.58
Salem Radio Network	GE3, 17	5.01, 5.20
Trinity Broadcasting radio service	G5, 3	5.58/5.78 (DS)
WHME-FM (103.1) South Bend, IN, ID-*Harvest FM*	G6, 15	5.58/5.78 (DS)
WROL-AM (950) Boston, MA (occasional Spanish)	GE3, 3	6.20

Rock Music

SuperAudio–*Classic Hits*-oldies	G5, 21	8.10/8.30 (DS)
SuperAudio–*Prime Demo*-mellow rock	G5, 21	5.22/5.40 (DS)
WOKI-FM (100.3) Oak Ridge-Knoxville, TN.	E2,5	6.20

Shortwave Broadcasters via Satellite

C-SPAN Audio 1: Various shortwave broadcasters	C3, 7	5.20
C-SPAN Audio 2: British Broadcasting Corp.(BBC)	C3, 7	5.41
Deutsche Welle	GE1, 22	7.38, 7.56, 7.74, 7.92
Radio Dubai United Arab Emirates (Arabic)	G7, 10	7.48
RAI Satelradio Italy (Italian)	G7, 14	7.38
WEWN–Worldwide Catholic Radio, Vandiver, AL	G1R, 11	5.40 (English), 5.58 (Spanish)
WHRA Africa/Middle East–World Harvest Radio, South Bend, IN	G6, 15	7.82
WHRI Americas–World Harvest Radio, South Bend, IN	G6, 15	7.46
WHRI Europe –World Harvest Radio, South Bend, IN	G6, 15	7.55
KWHR Asia–World Harvest Radio, South Bend, IN	G6, 15	7.64
KWHR South Pacific–World Harvest Radio, South Bend, IN	G6, 15	7.73
World Radio Network: WRN1 North America	G5, 6	6.80
World Radio Network: WRN2 North America	G5, 6	6.20 (Multi-lingual)

Sports

Madison Square Garden Network (MSG) Spanish Language S.A.P. (occ)	C4, 6	6.20

Speciality Formats

Aries In Touch Reading Service	C4,10	7.87
Colorado Talking Book Network	C1,3	5.60
Ozarkana Satellite Network	G6, 6	7.96
SuperAudio–Big Bands (Sun 0200-0600 UTC)	G5, 21	5.58/5.76 (DS)
Weather Channel–background music	C3, 13	7.78
Wisdom Radio Network	GE1, 12	7.10
Yesterday USA–nostalgia radio	G5, 7	6.80
	G9, 1	7.38

Talk Programming

American Freedom radio network	S4, 19	5.80
Amerinet Broadcasting	G1R, 17	5.58
For the People radio network	C1, 6	7.50
Friday Night Live (Friday 9-10 p.m.ET)	SBS6, 3 Upper (Ku-band)	6.20
(Friday 3 p.m. - midnight ET)	S4, 16	5.80
Omega Radio Network	GE1, 6	7.56
Orbit 7 Radio Network	C1, 14	7.48
Radio America Network	C1, 2	5.58
Republic Radio International	G7, 14	7.70
Talk America Radio Network #1–talk programs	GE3, 9	6.80
Talk America Radio Network #2–talk programs	GE3, 9	5.41
Truth Radio	S4, 19	7.56
TVRO.NET (featuring Keith Lamonica)	S4, 16	5.80
United Broadcasting Network	C1, 2	7.50
WOKIE Network–tech talk	SBS6, 3 Upper (Ku-band)	6.20
(network active when Megabingo is transmitting Monday-Friday 9-10 p.m. ET)		
WWTN-FM (99.7) Manchester, TN–news and talk	G5, 18	7.38, 7.56

Variety Programming

American Urban Radio Network	GE3, 9	6.30, 6.48 (DS)
CBM-AM (940) Montreal, PQ Canada–variety/fine arts	E2, 1	6.12
KBVA-FM (106.5) Bella Vista, AR., ID-*Variety 106.5*	G6, 6	5.58/5.76 (DS)
WCBS-FM (101.1) New York, NY (when TVRO.NET is not on the air with technical programming)	S4, 16	5.80
West Virginia Public Radio	GE1, 12	7.74
WNMX-FM (106.1) Waxhaw, NC	G1R, 17	7.92
WUSF-FM (89.7) Tampa-St. Petersburg, FL (Public Radio)	C4, 10	8.26 (N)

AUDIO SUBCARRIERS / SCPC SERVICES

FM SQUARED (FM²) AUDIO GUIDE

Another type of satellite audio carrier is known as FM Squared. FM Squared signals do not require a video carrier to exist. These signals are similar to audio subcarriers as we know it except that they are normally located below the 5.00 MHz audio subcarrier frequency that a normal satellite receiver can tune to. The Universal SC-50 can tune these frequencies and was used to update this section.

GE-3 Transponder 13 (C-band)

Ambassador Inspirational Radio	1.41, 4.47 and 4.65 MHz
Blank audio carriers	1.05 and 3.57 MHz
Focus on the Family	1.23 MHz
Information Radio Network	3.39 MHz
Int'l Broadcasting Network (IBN)	4.83 MHz
USA Radio Network	5.01 and 5.20 MHz
Various Religious Programs (no common ministry)	.33 and 3.75 MHz
VCY/America (channel 1)	.51 MHz
VCY/America (channel 2)	.78 MHz

GE-3 Transponder 17 (C-band)

Blank audio carriers	1.28, 1.77 and 3.57 MHz
Data Transmission	.80, 1.21, and 2.06 MHz
Focus on the Family	1.05 and 1.40 MHz
In-Touch Ministries	4.47 MHz
Salem Satellite Network	4.65, 4.84, 5.01, and 5.20 MHz
SRN News	.33 MHz

Galaxy 3R Transponder 3 (Ku-band)

Blank Audio Carriers	1.05, 2.06, 3.25, 3.62, and 4.20 MHz
Data transmissions	.06, 2.93, 3.07 and 3.17 MHz
AP Network News	3.53 MHz
In-Store audio network ads (various companies)	.71, .81, .91, 1.15, 1.26, 3.44, 3.70, 3.80, 3.88 and 3.97 MHz
Muzak Services	.15, .27, .39, .51, .98, 1.36, 1.48, 1.60, 1.72, 1.84, 1.96, 2.19, 2.31, 2.44, 2.56, 2.68, 2.80, 3.34, 4.08, 4.34, and 4.45 MHz

Galaxy 3R Transponder 16 (Ku-band)

Data transmissions	.64, 1.95, 2.18, 2.40, 2.52, 2.73, 2.82, 2.92, 3.20, 3.24, 3.26, 3.47, 3.73, 3.97, 4.03, and 4.14 MHz
In-Store audio networks	.15, .27, .39, .75, .87, .99, 1.11, 1.23, 1.35, 1.47, 1.59, 1.71, 1.83 and 2.07 MHz

SBS 6 Transponder 13 (Ku-band)

Data Transmissions	.06, .15, .25, .30, .35, .47, .51, .57, .65, .71, .74, .76, .84, .89, .93, .96, 1.05, 1.12, 1.22 and 2.08 MHz

Telstar 5 Transponder 6 (Ku-band)

Data Transmissions	.06, .15, .23, .30, .35, .38 .47, .57, .65, .71, .74, .76, .84, .89, .93, .96, 1.05, 1.12, and 1.22 MHz

Anik E1 Transponder 6 (Ku-band)

Nova Network FM Squared Services

Single Channel Per Carrier (SCPC) Services

By Robert Smathers

An SCPC transmitted signal is transmitted with its own carrier, thus eliminating the need for a video carrier to be present. Dozens of SCPC signals can be transmitted on a single transponder. In addition to a standard TVRO satellite system, an additional receiver is required to receive SCPC signals.

The frequency in the first column is the 1st IF (typical LNB frequency) and the second column frequency (in parentheses) is the 2nd IF (commercial receiver readout) for the SCPC listing. Both frequencies are in MHz.

GE-2 Transponder-Horizontal 12 (C-band)

1204.90 (75.1)	*Radio Marti*–U.S. Information Agency Spanish language radio service to Cuba

GE-2 Transponder-Vertical 13 (C-band)

1178.70 (81.3)	NASA space shuttle audio

GE-3 Transponder-Horizontal 13 (C-band)

1207.90 (52.1)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming
1204.45 (55.55)	KJAV-FM (104.9) Alamo, Tex–Spanish language religious programming/ *Nuevo Radio Christiana Network*
1204.25 (55.75)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming
1204.00 (56.0)	SRN (Salem Radio Network) News
1201.50 (58.5)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming
1201.30 (58.7)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming

Galaxy 6 Transponder 1-Horizontal (C-band)

1443.80 (56.2)	Voice of Free China (International Shortwave Broacaster) Taipei, Taiwan
1443.60 (56.4)	KBLA-AM (1580) Santa Monica, CA–*Radio Korea*
1443.40 (56.6)	Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1438.30 (61.7)	WWRV-AM (1330) New York, NY–Spanish religious programming and music, ID–*Radio Vision Christiana de Internacional*
1436.50 (63.5)	West Virginia Metro News–network news feeds

Galaxy 6 Transponder 3-Horizontal (C-band)

1404.80 (55.2)	KOA-AM (850)/KTLK-AM (760) Denver, Colo–news and talk radio/

SINGLE CHANNEL PER CARRIER (SCPC) SERVICES

	Denver Broncos NFL radio network/ Colorado college sports
1404.60 (55.4)	WGN-AM (720) Chicago, IL–news and talk radio/Northwestern college sports/ Chicago Bears NFL radio network
1404.40 (55.6)	Illinois News Network–network news feeds/WMVP-AM (1000) Chicago, IL–talk/Chicago Blackhawks NHL radio network
1404.20 (55.8)	Tribune Radio Networks/Wisconsin Radio Network
1402.70 (57.3)	WLAC-AM (1510) Nashville, TN–news and talk/*Road Gang* trucker program (overnight)/Tennessee college sports
1402.20 (57.8)	NorthWest Ag News Network - Ag info for the Pacific Northwest
1402.00 (58.0)	Occasional audio/Clemson college sports
1399.60 (60.4)	Occasional audio
1399.20 (60.8)	Occasional audio
1399.00 (61.0)	Sports Byline USA/Sports Byline Weekend/*On Computers* radio show
1398.50 (61.5)	Occasional audio
1398.30 (61.7)	WSB-AM (750) Atlanta, GA– news/talk/ Georgia college sports
1398.00 (62.0)	Occasional audio
1397.80 (62.2)	Occasional audio/Colorado Avalanche NHL radio network
1397.50 (62.5)	Minnesota Talking Book Radio Network–reading service for the blind
1397.10 (62.9)	Wisconsin Radio Network/Green Bay Packers NFL radio network/Wisconsin college sports
1396.90 (63.1)	Occasional audio
1396.70 (63.3)	Radio America Network
1396.40 (63.4)	Georgia News Network (GNN)–network news feeds
1396.00 (64.0)	WHO-AM (1040) Des Moines, IA–talk radio/Iowa News Network–network news feeds/Iowa college sports
1395.80 (64.2)	WTMJ-AM (620) Milwaukee, WI–talk radio/Green Bay Packers NFL radio network/Wisconsin college sports
1395.60 (64.4)	WGST-AM/FM (640/105.7) Atlanta, GA ID *Planet Radio*–news and talk radio/ Atlanta Falcons NFL radio network
1395.40 (64.6)	Michigan News Network–network news feeds/Michigan college sports
1395.00 (65.0)	Occasional audio
1394.70 (65.3)	WJR-AM (760) Detroit, MI–news and talk radio/Michigan News Network
1394.50 (65.5)	XEPRS-AM (1090) Tijuana, Mexico–Spanish language programming
1394.30 (65.7)	Michigan News Network/Michigan State college sports
1385.40 (74.6)	WDUQ-FM (90.5) Pittsburgh, PA – Jazz format
1385.00 (75.0)	Washington college sports
1384.60 (75.4)	WDUQ-FM (90.5) Pittsburgh, PA – Jazz format
1384.40 (75.6)	KOA-AM (850)/KTLK-AM (760) Denver, CO–news and talk radio/ Colorado college sports/Denver Broncos NFL radio network
1384.20 (75.8)	WSB-AM (750) Atlanta, GA – news/ talk/Georgia college sports
1383.70 (76.3)	Motor Racing Network (occasional audio) NASCAR racing
1383.10 (76.9)	KIRO-AM (710) Seattle, WA–news and talk radio/Seattle Seahawks NFL radio network
1382.90 (77.1)	Michigan News Network–network news feeds
1382.60 (77.4)	Soldiers Radio Satellite (SRS) network–U.S. Army information and entertainment radio/Army college sports
1382.00 (78.0)	Westwood One College Sports feeds/ Occasional audio
1381.60 (78.4)	KEX-AM (1190) Portland, OR–news and talk radio
1381.40 (78.6)	Occasional audio
1381.20 (78.8)	KJR-AM (950) Seattle, WA– sports talk radio/Washington State college sports
1377.10 (82.9)	In-Touch–reading service
1376.00 (84.0)	Kansas Audio Reader Network–reading service
1375.40 (84.6)	USA Radio Network/Agrinet Agriculture news service

Galaxy 6 Transponder 4-Vertical (C-band)

1376.00 (64.0)	Data Transmissions

Galaxy 6 Transponder 6-Vertical (C-band)

1347.00 (53.0)	WCRP-FM (88.1) Guayama, PR–Spanish language religious programming

Anik E2 Transponder 1-Horizontal (C-band)

1446.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio–North (Quebec) service

Anik E2 Transponder 7-Horizontal (C-band)

1326.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio–North (Eastern Arctic) service

Anik E2 Transponder 13-Horizontal (C-band)

1206.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio–North (MacKenzie) service
1205.00 (54.5)	Canadian Broadcasting Corporation (CBS) Radio–Occasional feeds/events

Anik E2 Transponder 17-Horizontal (C-band)

1126.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio–North (Western Arctic) service
1125.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio–North (Newfoundland and Labrador) service

Anik E2 Transponder 23-Horizontal (C-band)

1006.00 (54.0)	Societe Radio-Canada (SRC) Radio–AM Network
1005.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio-North (Yukon) service

Anik E1 Transponder 21-Horizontal (C-band)

1036.70 (63.3)	In-store music
1037.00 (63.0)	In-store music
1037.50 (62.5)	In-store music

SBS5 Transponder 2-Horizontal (Ku-band)

1013.60 (80.4)	Wal-Mart in-store network
1013.20 (80.8)	Wal-Mart in-store network
1012.80 (81.2)	Sam's Wholesale Club in-store network
1004.50 (89.5)	Wal-Mart in-store network
1004.00 (90.0)	Wal-Mart in-store network
1003.60 (90.4)	Sam's Wholesale Club in-store network
1003.20 (90.8)	Wal-Mart in-store network

SBS5 Transponder 12-Vertical (Ku-band)

1095.00 (91.0)	Russian-American Radio Network

RCA C5 Transponder 3-Vertical (C-band)

1404.80 (55.2)	RFD Radio Service
1404.60 (55.4)	Wyoming News Network–network news feeds/Northern Sports Network/ Wyoming college sports
1400.60 (59.4)	Learfield Communications/Indiana college sports
1400.40 (59.6)	Learfield Communications/ MissouriNet/St. Louis Rams NFL radio network
1400.20 (59.8)	Occasional audio/Data transmissions
1400.00 (60.0)	Learfield Communications/Purdue college sports
1396.60 (63.4)	Kansas Information Network/Kansas Agnet–network news feeds/Kansas State college sports
1396.20 (63.8)	MissouriNet
1396.10 (63.9)	Occasional audio/Illinois college sports
1395.90 (64.1)	Western Montana Radio Network/Red River Farm Network/Montana college sports
1395.70 (64.3)	MissouriNet
1386.40 (73.6)	Learfield Communications/Kansas City Chiefs NFL radio network
1386.20 (73.8)	Radio Iowa/Iowa college sports
1386.00 (74.0)	United broadcasting Network–talk radio
1384.60 (75.4)	Capitol Radio Network/Tennessee Oilers NFL radio network/North Carolina State college sports
1384.00 (76.0)	Occasional audio/ABC Direction Network–network news feeds
1383.80 (76.2)	Occasional audio/Syracuse college sports
1383.40 (76.6)	Capitol Radio Network/North Carolina college sports
1382.90 (77.1)	MissouriNet/Missouri college sports
1382.50 (77.5)	Virginia News Network–network news feeds
1382.10 (77.9)	Learfield Communications/ MissouriNet/Illinois college sports

Ken Reitz, KS4ZR

Learning to Love Satellites

It's a funny sort of silicon world out there and, unless you've been hunkering down in a bunker somewhere in Montana, your world is buzzing with streams of electrons. Just try to get through the day without using your computer, cell phone, VCR, scanner, television, radio, or microwave. Heck, even your watch is crystal controlled!

What we used to consider a convenience has become a necessity. How many of us would even consider doing without any of the above mentioned items? Yet, all this convenience has led to a certain amount of frustration and intimidation on a daily basis. Anyone who's ever tried to program a new VCR, found themselves out of range with their cell phone, or gotten an error message from a recalcitrant computer knows all about it.

Mention the word "satellite" and folks tend to roll their eyes up into their sockets just thinking about how complicated it all is. No wonder 65 million homes are wired for cable in this country! Few electronic gadgets seem so hard to put together and operate. And, yet, once you get over this critical stumbling block a very big universe of monitoring opportunity opens up for you.

Your cheerful "Launching Pad" editor toiling in the dish farm, happy once again to be infesting the pages at MT. (Photo by Jensen Reitz Montambault)

The Ubiquitous Satellite

Among the most sophisticated electronic creations of 20th Century people has been the communications satellite. But, what's not to love? They're quiet. You can't see them (usually). They're solar powered! Why, they're practically warm and fuzzy! And, they're the workhorse of the modern age. Billions of dollars in commerce are moved every day via satellite. News gathering, broadcasting, entertainment, and sports are all depending on those little metal moons to do their job.

The loss of Galaxy 4 this past summer was a sobering reminder of just how much we've come to depend on them. Ninety percent of North America's pager traffic was unceremoniously cut off. Tens of thousands of Muzak® subscribers' speakers suddenly went silent. National radio networks disappeared from the dials of tens of millions of radios all across America in an instant. Thank God, ESPN and the Home Shopping Network were unaffected!

Yes, strip away the ubiquitous satellite from our everyday life and we're back in the dark ages where the latest news was in a day old newspaper, cars were the size and shape of fighter aircraft and vacuum tubes ruled the world of electronics. Well, it's unthinkable!

A Satellite-Delivered Future

The genie is out of the bottle; you can't turn the tide–add your own cliché if you like, but the fact is that satellites are the future of communications. Does this mean traditional over-the-air modes are doomed? Not a bit. If you dusted off your great grandad's crystal radio set it would still pick up the AM band tonight just as it did 77 years ago with the first radio broadcast of the World Series in 1921.

While you can tune in the BBC World Service via satellite and the Internet, it's also available 24 hours a day on shortwave. Good old dependable (?), analog, AM modulated shortwave. It's still the cheapest way to receive the world in your home and will remain so for many years to come. International broadcasters are savvy enough to hedge their bets and you may be assured that when the going gets tough financially, shortwave delivery will be the last to go. So, keep your shortwave receiver operational and on standby!

Meanwhile, there are exciting things happening in the world of satellites. From the much anticipated, long delayed launch of AMSAT's Phase 3D bird, to the new and burgeoning world of digitally delivered broadcast satellites, to the seemingly endless stream of tiny telephone satellites, to the intriguing near future of 100 channel satellite radio for your car. Whew! So, strap yourself to an old Russian ICBM booster, get someone to light the fuse and lift off to a future world of satellites every month right here at *MT*'s Launching Pad.

Mailbag

I know, you're thinking, "Hey, this is the first column, how can you have a mailbag?" That's easy: all the old *ST* subscribers are now *MT* readers and a number of them sent in questions which deserve to be answered. And, besides, it gives me a chance to touch on a couple of typical beginner questions to get the ball rolling.

- Mary Wilson from Illinois wants to know if it's possible to get shortwave broadcasts via satellite without having a big C-band dish, an outdoor installation, and running cables into the house.

The short answer is "no." Small dish DBS services such as DirecTV, Primestar and DISH

have all ignored the potential of simulcasting the popular shortwave services. Only C-band offers these broadcasters. Incidentally, if you wait until next year, CD Radio — the satellite-delivered car audio service — will offer at least BBC World Service among its channel selections.

• Steve Simon of Ohio wants addresses and phone numbers of companies making Digital Video Broadcast receivers, and John Stankovitz from New Jersey read my review of the Pansat 100A DVB receiver and wants to know if any other companies make DVB receivers. You can both use the list of DVB makers below.

• Tom Marongelli, returning to the States from active duty in Korea, wants to know if there will be Korean programming available via satellite on his return.

Yes. There is a channel of programming from Korea available in the DVB (Digital Video Broadcast) standard on Telstar 5 Ku-band, channel 7712, vertical polarity. It's called The Asian Network (TAN) and is broadcast from Los Angeles with a regular daily schedule, but not 24 hours a day.

• Nicholas Murza from Arizona would like to receive Russian and Ukrainian programming via satellite. There are plans for some of the small dish services to offer such programming, but, as of this writing, which services and what prices have not been disclosed.

DIGITAL VIDEO BROADCASTING (DVB) RECEIVERS

Panarex Electronics
11672 Tuxford Street
Sun Valley, CA 93152
818-768-5161

PME Smallear/Digiear
6680 Lincoln Avenue
Lockport, NJ 14094
716-639-7778
www.digier.com

Taylor Enterprises
P.O. Box 100
Independence, KY 41051
606-356-9666

Samsonic Technology USA, Inc.
2182 DuPont Drive
Suite 203
Irvine, CA 92612
888-591-4416
www.samsonic.com

Meanwhile, WMNB-TV from New Jersey still broadcasts their analog service of Russian programming on SBS-5 transponder 5. The video is transmitted inverted, so to view it simply press the video invert switch on your receiver. If you have no such switch, run the Ku-band feed line into the C-band LNB connector. This will cause all normal Ku-band transmissions to appear inverted, but inverted Ku-band transmissions to appear normal. Got it?

• An unnamed reader asks via e-mail: "Do I need so-called 'digital-ready' LNB to receive Ku-band MPEG-2 programs such as TAN and Thai-TV? Or will my current LNB, which I have been using to watch non-digital programs, work?"

It all depends on the condition of your current LNB. If you are experiencing problems with it, you'll likely need a new LNB. However, I've been using a 40 degree C-band LNB which is at least 12 years old and a .9 dB Ku-band LNB which is probably 5 or 6 years old (neither of which is "digital ready") and both do an excellent job. My motto is: Never spend more than you have to on your satellite hobby.

• Monny Gilano of California wants to know about receiving European and Russian satellites from his location. A glance at the foot print charts in the '98/00 *World Satellite Yearly* indicates that there are no European or Russian satellites receivable directly from your location. Even the old Molniya satellites, with their highly elliptical orbit which might have helped, are no longer sending video. Intelsat 511 at 180 degrees E has an eastern C-band spot beam which covers California, but carries mostly Japanese programming. Your best bet for Russian programming is the aforementioned WMNB-TV.

• John Grow, VE2EQL from Quebec, is new to C-band and has been given a 10 foot dish which he is rebuilding. He's looking for used feeds, receivers and VCII modules and wants to know if any of the 70 MHz receivers, often seen at hamfests, are worth buying.

First, today's market in new C-band equipment is so over stocked that it's tough to pass up new receivers with a warranty which often sell for under $200. However, some used equipment in excellent shape can be had at half that price or even free. Check with local dealers, but don't pay over $200 unless the price includes a VCII. I'd stay away from the 70 MHz systems because it is harder to find repair parts for them and replacement downconverters tend to be expensive.

You can send your questions to me in care of this magazine or via e-mail at the above address. If you're sending via snail mail, please include a self-addressed stamped envelope.

It's Quiz Time!

Yes, satellite fans, here's a question which may require a little research. Name the year and the satellite on which the first radio waves were received on Earth. Send your answer to me in care of this magazine or to the e-mail address listed above. The winner or winners will earn my undying respect, the admiration of the entire *MT* circulation and enjoy the thrill of seeing their name in print. A truly lasting legacy.

Skip Arey, N2EI
tjarey@home.com

Understanding Radio Waves

Rachel Baughn reminded me recently that I have been writing for *Monitoring Times* for just a little over ten years now. Hard to believe I've gone from being the new kid on the radio writing block to being one of *MT*'s "Institutions." Frankly, the fact that I have, as Lord Buckley used to put it, "stomped on the Terra" for as long as I have without being actually placed in an institution is probably a bigger marvel than generating a monthly column.

Anyway, this humbling thought first led me up in the attic to the box that contains all those back issues of *MT*. This trip down memory lane further led me to realize that there are quite a few topics I have covered in that time that, for beginners and even some old timers, bear repeating. From time to time I intend to re-approach some of these subjects. This is not meant to be "Uncle Skip's Greatest Hits," but rather a fresh look at the kind of important material that all beginners need to get the most out of our hobby.

Most people who first enter the radio hobby start out with only the most basic exposure to radio's various "modes." Those who have never seriously tried to hear anything beyond their car radios are essentially only familiar with two of radio's modes, those being **amplitude modulation** (AM) and **frequency modulation** (FM). Most folks get through life without knowing anything more than that about radio. But, as beginning radio monitors you not only want to know more about this subject, you *need* to know more about it. This is mainly because, as a radio monitor, you have likely purchased a receiver that has several more modes of operation beyond the more familiar AM and FM modes. What do they all mean?

AM, FM, and other modes like CW, SSB are all just a jumble of letters circling a receiver control knob to most beginners. The problem has always been one of trying to come up with a nontechnical way to tell folks about these very technical basics of radio. The solution I have used in articles, books and speaking engagements over more than ten years of experience comes out of my misspent youth at the Jersey Shore. I spent many summers at the beach working on turning my skin into something that is putting my dermatologist's daughter through law school. Surfing has remained for me the best the way to explain all those positions on a receiver's mode switch.

Back in the citizen's band (CB) boom years of the early seventies, some people used to enjoy making horses' patoots of themselves by keying down their microphones without saying anything. Sadly, you can still hear this moronic behavior on some segments of the 75 meter amateur radio bands. This crude form of jamming is known as "throwing a carrier." The **carrier** is just what its name implies. It is the signal that serves to carry the information to your receiver.

Just like those red hot days of the CB craze, a steady, unbroken carrier is little more than a waste of electricity. It communicates nothing at all by itself. The carrier signal becomes the radio signal that we all know and love *only* when it is modulated in some way. **Modulation** is the process of manipulating the carrier signal in some way to allow it to convey **information**. This modulated signal is then **demodulated** by the circuits in your receiver allowing you to hear the audio.

Clear as mud, huh? Now you see why I have leaned so heavily on the surfing analogy all these years.

Think of the ocean. If you are a life-long, landlocked resident of the Midwest, head to your video store and rent *The Endless Summer* or any other surfing movie that has more boards than bikinis in it. You'll get the idea.

If the surf is down and there are no waves to speak of, that would represent an unmodulated carrier.

Okay, now let's all visualize that the surf is up. The waves are breaking on the beach at different heights or speeds. These waves of varying size and spacing could be thought of as representing modulation of the ocean/carrier. But of course, as any surfer will tell you, not all waves are created equal. These different waves/modulations are going to react differently and (dropping the analogy for a second) will require different receiving equipment (demodulation equipment) to be heard and understood.

Continuous Waves

While continuous waves would represent every surfer's dream, to radio folks continuous wave signals are best known as "CW." CW is the simplest form of transmission — a plain unmodulated carrier simply switched on and off in a unique pattern. The dots and dashes of the International Morse code are formed by someone hitting a key to turn the carrier on and off. Think of these dots and dashes as waves of equal height and speed washing up on the beach. Imagine they start coming in sets of three and sets of five with a lull in between each set. The duration of the sets and the spaces in between are like dots and dashes.

Since an unmodulated carrier has no "sound" to it, your receiver has to jump through a few hoops to give you something you can hear. Most modern receivers have a CW position on their mode switch. Older receivers will often have a BFO switch. BFO stands for Beat Frequency Oscillator. In either case, the switch serves to turn the "soundless" CW signal into a recognizable series of audio tones. The "demodulation" happens in the listener's head when they translate the pattern of dots and dashes into letters and numbers.

Learning to copy CW signals can be a lot of fun. Many amateur radio operators still

enjoy using this mode. Pick up a code practice tape from one of the advertisers in *MT* and join in the fun.

Amplitude Modulation

Now imagine that the waves are coming toward the beach spaced exactly 20 feet apart and that they hit the beach every five seconds. The only "change" you can see occurring is that all these otherwise equal waves are different heights. Getting back to radio, this change in **amplitude** (a fancy word for height) can be interpreted as a change in voltage at the receiver that can then be translated into an audio signal. Eureka, voices that come out of the air!

Frequency Modulation

If you have spent any time tuning around with an AM radio or have done some listening on the shortwave broadcast bands, you have probably noticed that there is a lot of noise out there. Atmospheric and people-made noise can get in the way of your listening pleasure. Radio pioneer Edwin Armstrong got peeved enough at all this background noise that he set to work to develop a different form of modulation: one that would give a very clear signal that was esentially free of static.

Thus, FM was born. Armstrong figured that you could keep the amplitude constant and then **deviate** or change the frequency back and forth off of the center frequency. Back to the beach! Imagine the waves coming toward the beach are all the same height. The difference now is that the waves no longer hit the beach spaced uniformly apart. Now they are hitting the beach faster or slower, that space between each successive wave is changing instead of its height.

Doing this gave a clear, static-free signal. The trade-off was a reduction in the distance the signal could be practically used. However, most radio services aren't interested in sending a signal all the way around the world. For this reason, most local communication is done these days in the FM mode. Police, fire, business, amateur radio operators and others make wide and varied use of FM in the VHF and UHF frequency ranges. (Thus giving rise to the monitoring hobby of scanning.)

Since most modern scanners cover such a wide range of frequencies, the beginner can get really confused about the two primary types of FM signals out there in scanner land. Knowing the difference can be important when setting the controls on your scanner.

Single Sideband

If you have been tuning across the shortwave frequencies for any length of time, you have no doubt run across some signals that sound like a duck quacking in a tunnel. These are **single sideband** (SSB) signals. From the earliest days of radio, folks were always trying to do two things: cram more signals into less space and get more signal from a given amount of power. SSB does both jobs remarkably.

To explain this we will need to stretch the limits of our surfing analogy. Imagine that you are seeing the wave pattern we dreamed up for AM — waves equally spaced but with varying heights. Now imagine that the waves are generating an equal, mirror image of themselves underneath the waves. The way you generate SSB is to start with a low-powered AM signal (one with waves on the top and underneath). Circuits in the transmitter serve to remove one of the side bands (the lower wave or the upper wave) *and* the carrier (i.e., remove the ocean. See, I told you this was going to get weird.)

Now the transmitter amplifies the remaining sideband (the oceanless waves become tidal waves). This produces a signal that is about four times as efficient as a regular AM signal with the same amount of power behind it. It also only occupies half the space of a standard AM signal. Almost like getting something for nothing, but not quite: On the receiving end, all you hear is that duck sound.

Unless, of course, your receiver is designed to accept this form of modulation. Remember when we talked about the Beat Frequency Oscillator (BFO) in relation to CW signals? The BFO signal serves as a substitute for the missing sideband, giving you a normal voice instead of duck noises. Most modern receivers have done away with the BFO in favor of a mode switch that will include CW (as previously discussed) as well as (USB) **upper sideband** (that's for the waves on top) and (LSB) **lower sideband** (for those mirror image waves beneath the sea). Both modes are used, so if you hear a duck voice and switching to one position does not do the trick, try the second. If you are using a receiver with a BFO you simply adjust the BFO Pitch control to get the same effect.

Hang ten!

VIEW FROM ABOVE

WATCHING THE WEATHER SATELLITES

Lawrence Harris
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http://www.peverell.demon.co.uk/

Keeping an Eye on the Weather

I wrote my first article on weather satellites for the United Kingdom's Remote Imaging Group (RIG), back in the 1980s. At that time, I was new to weather satellites, though scientific satellite operations had previously been my profession. A couple of years later, the UK's *Short Wave Magazine* invited me to write a monthly column, which has now been running for ten years. I also write a column on astronomy for our local evening paper and have been a reader of *Monitoring Times* for well over a year. An invitation to write a column (replacing the one previously written for sister magazine *Satellite Times*) was therefore most welcome.

Here in Britain, I am one of those people that could be described as an "American-ophile," because having worked professionally with American space scientists on combined UK-British-Nederlands satellite projects during the 1970-80s, I am often seen or heard writing or talking positively about the American space program. I have yet to visit the United States, but perhaps one day ...?

Weather satellites: the background

As a lad of 12 when Sputnik-1 first hit the headlines, I became fascinated with the idea of satellites and their applications. History records that the first television picture "from space" was from the American satellite TIROS-1, transmitted on April 1, 1960 - see figure 1. Just three years later, TIROS-8 transmitted the first "weather satellite" signal in December 1963, confirming the American lead in weather satellite technology. It carried a vidicon TV camera for Automatic Picture Transmission (APT). This system involved the direct transmission of an analog signal in real-time that could be decoded to show land-sea-cloud pictures. These signals could be received by suitably equipped ground stations around the world. The APT service has remained available since 1963, with new satellites being launched every few years.

In December 1971, the Meteor satellites of the former USSR started a compatible APT service. Information from Grant Zehr (published in the book *Communication Satellites* by Larry Van Horn) indicates that prior to 1977, most Russian Meteor satellite transmissions were only made over Russia. The usual frequency was 137.300 MHz, though Meteor 1-30 (which I was monitoring until it was finally switched off several years ago) used a number of frequencies in the 137 MHz band. Later (class 2) Meteor satellites regularly transmitted images over the U.S. on either 137.300 or 137.400 MHz.

I collected several Meteor images in the 1980s, but in a non-PC compatible format that I could not display when I upgraded. I do have the original cassette tape recordings somewhere — which can still be decoded!

The use of geostationary satellites for weather monitoring followed a few years after the start of the polar satellites' APT service. In 1974, the American geostationary SMS-1 satellite started the weather facsimile (WEFAX) service, becoming the first geostationary meteorological satellite. Because it was practical and efficient, WEFAX used a compatible analog signal, so that similar equipment could be used for both APT and WEFAX.

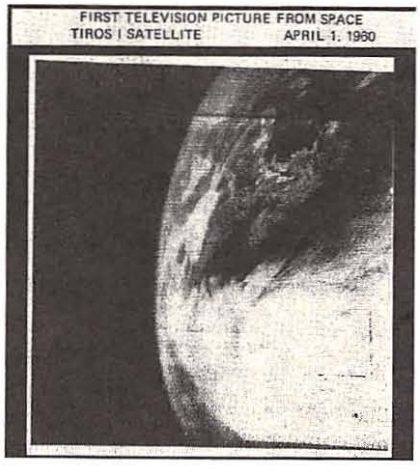
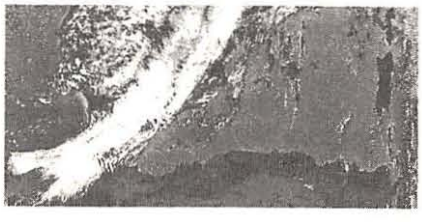


FIGURE 1 (left): *Early TIROS picture*

FIGURE 2 (below): *Early NIMBUS picture.*



Picture production

Image generation by weather satellites involves using a telescope (radiometer) and producing an image line comparable to a television picture line — but much more slowly. This line comprises the brightness variations of the scene below: dark sea and bright clouds. These variations are impressed onto a 2.4 kHz sub-carrier by the process of amplitude modulation (AM). The resulting AM signal is then used to frequency modulate the main radio frequency carrier (in the 137-138 MHz band for the polar orbiters, or the 1675-1698 MHz band for geostationary satellites). The final signal can therefore be decoded by the same equipment (though an additional down-converter is required for WEFAX decoding).

The next development with weather satellite technology involved the move to a higher resolution, digital data transmission format in 1977 with the NOAA-2 satellite. Digital transmissions were consolidated as high resolution picture transmission (HRPT) telemetry from the advanced very high resolution radiometer (AVHRR) in 1978, when the TIROS-N series satellites were launched. This service has been provided continuously (with APT) ever since, and there are now more than 2,700 APT user stations worldwide. The image format has remained the same.

America's GOES (Geostationary Operational Environmental Satellite) constellation transmits WEFAX from at least two positions; GOES-East (currently GOES-8) is at about 74 degrees west longitude, and GOES-west (now GOES-10) is maneuvering further west.

Equipment needed

You can, of course, receive weather satellite signals from the polar orbiters without decoding them, and you can do this at little cost. For monitoring, you need an external antenna and a receiver capable of tuning to the 137 MHz band: Check the frequencies given at the end of this column.

NOAA satellites transmit continuously, so you can hear them whenever they are above your horizon. General purpose receivers are normally unsuitable for providing a quality signal for decoding, because of the unusual characteristics of weather satellite (WXSAT) signals. However, you can still receive a strong signal for monitoring.

Most VHF antennas, even a 2 meter antenna,

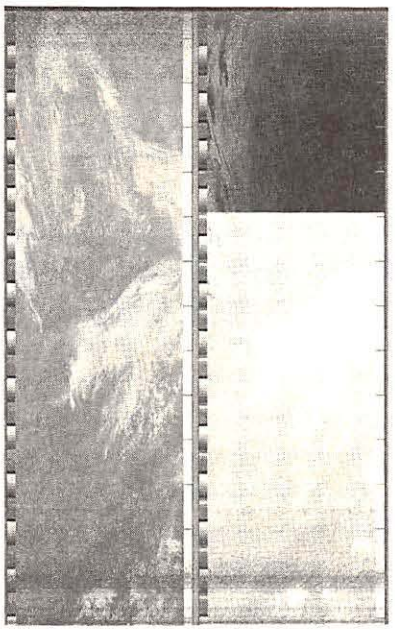


FIGURE 3: *NOAA image September 2 at 1750UTC.*

should receive enough signal from a NOAA WXSAT to let you confirm that you have heard them. The optimum antenna has long been considered to be a right-circularly-polarized crossed-dipole, but some experimenters have researched alternative designs and come up with the quadrifilar helix (QFH). For purely test purposes, even a random length of wire connected to your receiver's input will "hear" a NOAA or a Meteor — as I have often confirmed! Just don't expect to decode the telemetry.

Signal characteristics

The sound of an APT signal is easily recognized. The signal contains a data line length of half-a-second. The extracted audio signal therefore has a repetition rate of two "clicks" per second, each click containing image information. Meteor APT sounds like "croak-croak" every second. NOAA WXSATS encode two different images in each line, so this signal sounds like "tick-tock, tick-tock" every second.

In the NOAA picture, the infra-red image is continuous, but the other channel varies. In daylight transmissions, an image from the visible-light sensors forms the second channel. At night, a near-infra-red image forms the second channel. The satellites cross the terminator twice each orbit, so for much of the year we can see the channel switch happen — and hear it clearly from the receiver's speaker.

Prediction software and "elements"

The first item in any satellite monitor's armory is surely a satellite predictions program. There are several freeware programs available from various sources on the Internet, including AMSAT's web page: **http://www.amsat.org**

This has links to several programs, including Thomas C. Johnson's PC-Track version 3.1 written in May 1995 (the author being apparently no longer contactable), and STS-Orbit Plus, written by David H. Ransom. Other programs are also available from this site.

With a predictions program, you need to ensure that the software produces accurate data; this means updating the Kepler elements file every few weeks. Kepler elements are generated from measurements made by radar analysis of the velocity of satellites. Satellite orbits are modified by a number of factors, including residual atmospheric friction (most satellites are above the densest parts of the atmosphere).

Earth's gravitational anomalies (called mascons - mass concentrations) also change the orbits, and the Moon's variable relative distance has an effect. The combined result of these factors is that we usually need to update Kepler elements at least once each month. I update at least once each week using a large database of elements issued on the ftp site: **ftp://128.149.63.2/ pub/space/elements/satelem/**

The directory shown is usually updated on Sunday evenings. Data is also issued by the Orbital Information Group (OIG): **http://oigsysop.atsc.allied.com**

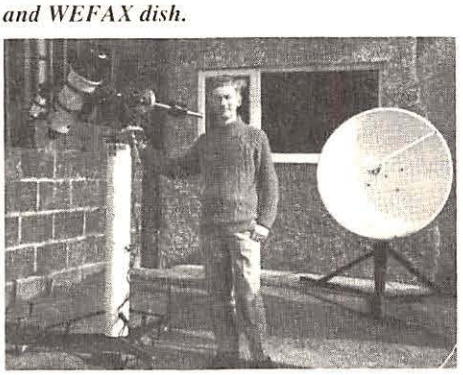
Current orbital elements for the weather satellites are carried on the CelesTrak site at: **http://celestrak.com/NORAD/elements/weather.txt ftp://ftp.celestrak.com/pub/elements/weather.txt** and are usually updated daily.

Current WXSAT status

With the equipment listed, you can expect to hear NOAAs-12, 14 and 15, transmitting on the frequencies listed at the end of the column. Meteor WXSATs usually transmit in daylight only, so are not normally heard during the night. Meteor 3-5 is currently the operational CIS (Commonwealth of Independent States) WXSAT.

A new Resurs 1- (number 4) satellite is being tested, and may be heard sometimes. The latest information from the Resurs satellite operators is that the onboard systems have checked out satisfactorily. Transmissions have apparently been mostly on 8192 MHz. On rare occasions, signals may be heard on 137.40 MHz from the oceanographic satellites SICH-1 or OKEAN-4, but such transmissions are only for a few minutes at a time.

FIGURE 4: *Me and my optical telescope and WEFAX dish.*



E-mail

Readers can e-mail me at: *lawrenceh@peverell.demon.co.uk* Future editions will include information on the move to digital signals, news about CIS WXSAT operations and readers' WXSAT web pages.

FREQUENCIES:

Polar orbiting WXSATS:

NOAA-14 transmits APT on 137.620 MHz

NOAA-12 and -15 transmit APT on 137.500 MHz

NOAAs transmit beacon data on 136.770 or 137.770 MHz

METEOR 3-5 transmits APT on 137.850 MHz when in sunlight

Resurs 1-4 may transmit APT on 137.300 or 137.400 MHz

OKEAN-4 and SICH-1 sometimes transmit briefly on 137.400 MHz

Geostationary WXSATS:

GOES-8 and GOES-10 use 1691 MHz for WEFAX

Larry Van Horn, N5FPW
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New U.S. Coast Guard Air Station Opens

The U.S. Coast Guard opened a new air station at Atlantic City, New Jersey, on June 8, 1998. Coast Guard Group Atlantic City and Air Station Atlantic City are located at the Atlantic City International Airport. The US$12.3 million project took 19 months to complete. Coast Guard aircraft 6501, 6511, 6513, 6522, 6529, 6539, and 6580 (HH-65A Dolphin helicopters) have been operating from the station since May 18.

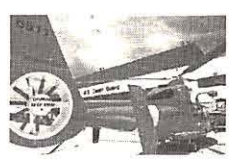
Air Station Atlantic City will provide search and rescue service to the Atlantic coastal regions from Connecticut to Virginia. Air Station Cape May's and Air Station Brooklyn's operational responsibilities overlapped in that region, and the Coast Guard decided the same level of coverage could be maintained by consolidating the two air stations into one facility, according to Kathy Scott, aviation shore facilities manager, Office of Aviation Management at Coast Guard headquarters in Washington, D.C. Both air stations at Cape May and Brooklyn will be decommissioned.

One of Air Station Atlantic City's seven HH-65s will maintain a Coast Guard presence in the Brooklyn area, operating out of Air Facility Long Island, N.Y., at the Frances S. Gabreski Airport, from June 8 to October 15, according to Lt. Cdr. Brad Bean, Air Station Atlantic City aviation engineering officer.

Aircrews will rotate between Atlantic City and Long Island during search and rescue season and will use Air National Guard facilities, Bean said.

Those of you in the Atlantic City area should tune in on frequencies in Table one for Coast Guard activity. Thanks to J.D. Erskine, *World Maritime News*, and Coast Guard Atlantic Area Public Affairs for the news.

HH-65A Dolphin helicopter hovers during a rescue. Photo courtesy of the United States Coast Guard



This HH-65 Dolphin helicopter and six others now call Atlantic City home. Photo courtesy of the United States Coast Guard

Navy Fleet Warning/Tactical

Those of you who live near a U.S. Navy ship homeport or Coast Guard cutter base should include 277.800 MHz in your scanner loadout. This frequency is guarded continuously by all U.S. Navy ships (except submarines) when underway. Coast Guard cutters may use this frequency to communicate with Navy ships when required. It is also used for navigational purposes during periods of reduced visibility when entering or leaving port. It is used by the Navy as well for local ship-shore harbor communications on a secondary basis to its intership use.

U.S. Navy on Inmarsat

Table two is a list of the known U.S. Navy ship tactical callsigns that have been monitored on Inmarsat satellite frequencies. We would like to thank John Wilson for supplying us with this excellent list.

If you have a milcom frequency or callsign list, we want to hear from you. Send it to our Brasstown mailing address or email me at the address in the masthead. See you in two months and good hunting.

TABLE ONE: ATLANTIC CITY AREA CG ACTIVITY

Freqs MHz	Use
108.6000	Automatic Terminal Information Service (ATIS)
120.3000	Atlantic City International Tower (paired with 239.0)
121.9000	Atlantic City International Ground Control (paired with 284.6)
122.9500	Unicom
124.6000	Approach/Departure Control (paired with 263.6)
127.8500	Atlantic City International Clearance Delivery (paired with 396.0)
134.2500	Approach/Departure Control (paired with 385.5)
156.6000	VHF marine channel 12 (Nationwide)
156.8000	VHF marine channel 16–Distress, safety and calling (Nationwide)
157.0500	VHF marine channel 21 (Nationwide)
157.1000	VHF marine channel 22 (Nationwide)
157.1500	VHF marine channel 23 (Nationwide)
157.1750	VHF marine channel 83 (Nationwide)
165.2625	Atlantic City Coast Guard Station Law Enforcement (Simplex)
229.3250	Search and Rescue Datum Marker Beacon (Nationwide)
229.3350	Search and Rescue Datum Marker Beacon (Nationwide)
237.9000	Rescue Coordination/Aircraft Homing (Nationwide)
239.0000	Atlantic City International Tower (paired with 120.3)
240.6000	Search and Rescue Datum Marker Beacon (Nationwide)
242.6500	Search and Rescue Datum Marker Beacon (Nationwide)
242.6625	Search and Rescue Datum Marker Beacon (Nationwide)
243.0000	Military UHF Calling/Emergency frequency
263.6000	Approach/Departure Control (paired with 124.6)
275.1000	Search and Rescue Datum Marker Beacon (Nationwide)
282.8000	Search and Rescue Net (Nationwide)
284.6000	Atlantic City International Ground Control (paired with 284.6)
381.7000	Search and Rescue/Law Enforcement Operations (Nationwide)
381.8000	Search and Rescue/Law Enforcement Operations (Nationwide)
383.9000	Search and Rescue/Law Enforcement Operations (Nationwide)
385.5000	Approach/Departure Control (paired with 134.250)
396.0000	Atlantic City International Clearance Delivery (paired with 127.85)

TABLE TWO: U.S. NAVY INMARSAT CALLSIGNS

Callsign	Hull Number	Ship Name	Homeport
Admiral's Elite	FFG-50	USS Taylor	Mayport, FL
Authentic	FFG-45	USS De Wert	Mayport, FL
Aviation Specialist	DDG-57	USS Mitscher	Norfolk, VA
Bartman	FFG-56	USS Simpson	Norfolk, VA
Beach	CG-60	USS Normandy	Norfolk, VA
Bellafonte	DD-989	USS Deyo	Norfolk, VA
Big Ben	FFG-42	USS Klakring	Norfolk, VA
Big Name	DD-981	USS John Hancock	Mayport, FL
Big Sky	TAE-27	USS Butte	No Homeport
Big Tree	AOE-3	USS Seattle	Earle, NJ
Border Peak	TAE-34	USS Mount Baker	Charleston, SC
Briar Patch	FFG-36	USS Underwood	Mayport, FL
Brillance	CG-56	USS San Jacinto	Norfolk, VA
Bristle	FFG-49	USS Robert G. Bradley	Mayport, FL
Bull Winkle	DD-980	USS Moosbrugger	Mayport, FL
Carlos	FFG-52	USS Carr	Norfolk, VA
Chairman	DD-968	USS Arthur W. Radford	Norfolk, VA
Cheers	DD-969	USS Peterson	Norfolk, VA
Cherry Tree	CVN-73	USS George Washington	Norfolk, VA
Cocktail Onion	DD-987	USS O'Bannon	Mayport, FL
Colorful	CG-66	USS Hue City	Mayport, FL
Cue Ball	DD-970	USS Caron	Norfolk, VA
Eagle	AOE-6	USS Supply	Earle, NJ
Ecilpse	CVN-72	USS Abraham Lincoln	Everett, WA
Ecilpse II	CVN-72	USS Abraham Lincoln	Everett, WA
Ecilpse III	CVN-72	USS Abraham Lincoln	Everett, WA
Ecilpse IV	CVN-72	USS Abraham Lincoln	Everett, WA
Empire	CG-47	USS Ticonderoga	Pascagoula, MS
Father Navy	DDG-52	USS Barry	Norfolk, VA
Fire Storm	LSD-48	USS Ashland	Little Creek, VA
Firm Grip	ARS-53	USS Grapple	Little Creek, VA
Five Flags	LSD-38	USS Pensacola	Little Creek, VA
Four Score	CG-64	USS Gettysburg	Mayport, FL
Friar	TAFS-6	USS San Diego	No Homeport
Frontiersman	FFG-28	USS Boone	Mayport, FL
Garden Staff	LPD-14	USS Trenton	Norfolk, VA
Governor	DD-979	USS Conolly	Mayport, FL
Hammering Hank	FFG-55	USS Elrod	Norfolk, VA
Handy	MCM-13	USS Dexterous	Ingleside, TX
Hauler	LST-1194	USS La Moure County	Little Creek, VA
Hebrew	FFG-58	USS Samuel B. Roberts	Norfolk, VA
Hinge	CG-51	USS Thomas S. Gates	Pascagoula, MS
Historian	FFG-13	USS Samuel E. Morison	Mayport, FL
Hope Foundation	LSD-50	USS Carter Hall	Little Creek, VA
Hospital	TAH-20	USS Comfort	No Homeport
Intrepid	CG-61	USS Monterey	Norfolk, VA
Ireland's Own	FFG-8	USS McInerney	Mayport, FL
Iron Clad	AO-179	USS Merrimack	Norfolk, VA
Iron Grip	ARS-51	USS Grasp	Little Creek, VA
Jelly	TAFS-5	USS Concord	No Homeport
Joker	DD-982	USS Nicholson	Norfolk, VA
Keelboat	LPD-13	USS Nashville	Norfolk, VA
Left	FFG-53	USS Hawes	Norfolk, VA
Leprechaun	AGF-3	USS LaSalle	Gaeta, Italy
Magnolia	LSD-12	USS Shreveport	Norfolk, VA
Mary Lou	AE-28	USS Santa Barbara	Charleston, SC
McIntosh	FFG-59	USS Kauffman	Norfolk, VA
Mick	DDG-64	USS Carney	Mayport, FL
Monty's Deal	FFG-32	USS John L. Hall	Pascagoula, MS
Motorman	AOE-4	USS Detroit	Earle, NJ
Mountaineer	LHD-3	USS Kearsarge	Norfolk, VA
Musclemen	LSD-44	USS Gunston Hall	Little Creek, VA
Northwest	LSD-41	USS Whidbey Island	Little Creek, VA
Oregon Trail	FFG-11	USS Clark	Norfolk, VA
Passion	MCM-12	USS Ardent	Ingleside, TX
Peninsula	CG-71	USS Cape St. George	Norfolk, VA
Pierside	LCC-20	USS Mount Whitney	Norfolk, VA
Pineapple	FFG-39	USS Doyle	Mayport, FL
Pirates	LSD-46	USS Tortuga	Little Creek, VA
Plateau	AO-186	USS Platte	Norfolk, VA
Polar Bear	AOE-8	USS Arctic	Earle, NJ
Puzzle	DD-978	USS Stump	Norfolk, VA
Quiet Warrior	DD-963	USS Spruance	Mayport, FL
Resort	LHA-4	USS Nassau	Norfolk, VA
River Siege	CG-69	USS Gettysburg	Mayport, FL
Rose Festival	LSD-37	USS Portland	Little Creek, VA
Satcom III	LCC-20	USS Mount Whitney Staff	Norfolk, VA
Seaport	LPD-15	USS Ponce	Norfolk, VA
Semaphore	DD-997	USS Hayler	Norfolk, VA
Seminole	CG-58	USS Philippine Sea	Mayport, FL
Serein I	CV-67	USS John F. Kennedy	Mayport, FL
Serein II	CV-67	USS John F. Kennedy	Mayport, FL
Soaring Hero	DDG-61	USS Ramage	Norfolk, VA
Solomon Hero	DDG-55	USS Stout	Norfolk, VA
Steel Halo	DDG-58	USS Laboon	Norfolk, VA
Stinger	LHD-1	USS Wasp	Norfolk, VA
Stinger II	LHD-1	USS Wasp	Norfolk, VA
Strong Man	FFG-31	USS Stark	Mayport, FL
Sunrise	CVN-70	USS Carl Vinson	Bremerton, WA
Sunrise II	CVN-70	USS Carl Vinson	Bremerton, WA
Sunrise III	CVN-70	USS Carl Vinson	Bremerton, WA
Super Natant	CVN-71	USS Theodore Roosevelt	Norfolk, VA
Super Natant II	CVN-71	USS Theodore Roosevelt	Norfolk, VA
Swimming Pool	CG-55	USS Leyte Gulf	Norfolk, VA
Swords Edge	FFG-15	USS Estocin	Norfolk, VA
Tar Heel	FFG-40	USS Haleyburton	Norfolk, VA
Terrier	DDG-995	USS Scott	Mayport, FL
Texan	LPD-4	USS Austin	Norfolk, VA
Thicket	DD-988	USS Thorn	Norfolk, VA
Three Rivers	AO-178	USS Monongahela	Norfolk, VA
Timer Stand	FFG-29	USS Stephen W. Groves	Pascagoula, MS
Tower	CG-68	USS Anzio	Norfolk, VA
Twilight I	CVN-68	USS Nimitz	Norfolk, VA
Twilight II	CVN-68	USS Nimitz	Norfolk, VA
Velarium	CG-72	USS Vella Gulf	Norfolk, VA
War Hero	DDG-51	USS Arleigh Burke	Norfolk, VA
Whetstone	DD-977	USS Briscoe	Norfolk, VA
White Knuckle	CG-48	USS Yorktown	Pascagoula, MS
White Sand	LHA-2	USS Saipan	Norfolk, VA
White Wolf	CVN-69	USS Dwight D. Eisenhower	Norfolk, VA
Yuletide	FFG-47	USS Nicholas	Norfolk, VA

Jean Baker, KIN9DD

Coming to Terms with Radar - 2

Welcome aboard, everyone! In this issue, we present part 2 of our look at air traffic control (ATC) radar, and continue our lengthy listing of airline callsigns.

Unlike the Air Route Surveillance Radar (ARSR) mentioned last month, **Airport Surveillance Radar** (ASR) is designed to provide short-range (50 mile) coverage in the general vicinity of an airport, and it enables the expeditious handling of terminal area traffic by showing precise aircraft locations on a radarscope.

Most medium-to-large radar facilities at U.S. airports utilize some form of automated radar terminal system (ARTS). This is the generic term for the functional capability afforded by several automated systems. Each differs in functional purpose and equipment. ARTS, plus a suffix Roman numeral, denotes a specific system; a following letter indicates a major modification to that particular system.

In general, an ARTS display shows the terminal controller an aircraft's identification, flight plan data, and other flight-associated information in conjunction with his other radar presentation. Normal radar co-exists with the alpha-numeric display. In addition to enhancing visualization of the air traffic situation, ARTS facilitates the transfer and coordination of flight information. Each ARTS level has the ability to communicate with other ARTS types, as well as with air traffic control centers (ARTCCs). The systems in ascending order of sophistication are ARTS II, ARTS IIA and E, ARTS III, and ARTS IIIA and E.

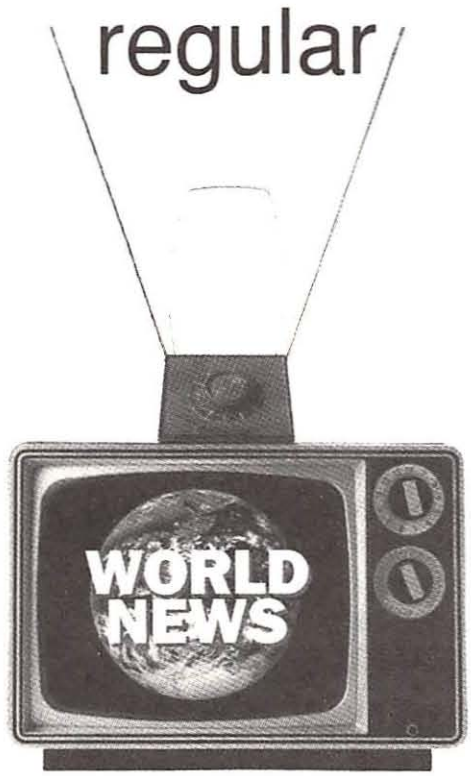
Air Route Surveillance Radar (ARSR) generically refers to ARTCC radar used primarily to detect and display an aircraft's position while en route between terminal areas. In some instances, ARSR may enable an ARTCC to provide terminal radar services similar to those provided by a radar approach control.

Enroute radar coverage can extend up to 400 miles; however, 200 miles is the normal working range in an ARTCC.

National Airspace System Stage A comprises the enroute air traffic control system's radar, computers and computer programs, controller plan view displays (PVDs/Radarscopes), input/output devices, and the related communications equipment which are integrated to form the heart of the automated Instrument Flight Rules (IFR) air traffic control system. This equipment performs flight data processing (FDP) and Radar Data Processing (RDP). It interfaces with automated terminal systems and is used in the control of enroute aircraft.

Both airport surveillance radar and air route surveillance radar use radar data processed (digitized) displays at least 75% of the time — referred to as being in the narrowband mode. During the remaining time, the backup (broadband) system is put into use, so that the main systems can undergo preventive maintenance. Each radar system has several backups.

All ARTCC radars in the conterminous United States and most airport surveillance radars have the ability to interrogate Mode C



(see last month) and display altitude information to the controller from appropriately equipped aircraft. However, there are a small number of airport surveillance radars that are still two dimensional (range and azimuth only); consequently, altitude information must be obtained from the pilot.

At some locations within the ATC enroute environment, secondary radar only (no primary radar) gap filler radar systems are used to give lower altitude radar coverage between two larger radar systems, each of which provides both primary and secondary radar coverage. In the geographical areas serviced by secondary radar only, aircraft *without* transponders *cannot* be provided with radar service. Additionally, transponder-equipped aircraft cannot be provided with radar advisories concerning primary targets and weather.

There is one more type of radar that we will briefly examine: **Precision Approach Radar** (PAR). In the United States, it is mostly utilized by the military, although there is some civilian usage.

Radar equipment in some ATC facilities operated by the Federal Aviation Administration (FAA) and/or the military services at joint-use civil/military locations and separate military installations are used to detect and display azimuth, elevation, and range of aircraft on the final approach course to a runway. This equipment may be used to monitor certain non-radar approaches, but it is primarily used to conduct a precision instrument approach. In this case the controller issues guidance instructions to the pilot based on the aircraft's position in relation to the final approach course (azimuth), the glidepath (elevation), and the distance (range) from the touchdown point on the runway as displayed on the radarscope.

Each PAR scope is divided into two parts: the upper half presents altitude and distance information, and the lower half presents azimuth and distance. Range is limited to 10 miles, azimuth to 20 degrees, and elevation to 7 degrees. Consequently, only the final approach area is covered.

We've really come a long way from the days when all radarscopes were mounted horizontally and little plastic markers called "shrimp boats" (representing flights worked in a particular sector) were pushed around on the scope to help controllers identify an aircraft's position. Unfortunately, when these shrimp boats were in use, all it took was one explosive sneeze from a controller to wipe away a whole sector's portion of the sky!

More Airline Callsigns

ODYSSEY - Odyssey international
OLYMPIC - Olympic Airways S.A.
OSCAR NOVEMBER - Air Nauru
PARAGUYA - Lineas Aereas Paraguayas
PARCEL EXPRESS - Apex Air Cargo
PERU - Aeronaves Del Peru S. A.
PHILIPPINE - Philippine Air Lines, Inc.
POLISH AIR FORCE 1 - Presidential Flight
PROMPTAIR - Air Cargo Carriers, Inc.
QANTAS - QANTAS Airways Limited
RAINBIRD - Island Air Express
RED CROSS - International Red Cross
REEVE - Reeve Aleutian Airways, Inc.
REGAL - Crownair
RELIANT - Reliant Airlines, Inc.
RICHAIR - Rich International Airways, Inc.
ROMEO NOVEMBER - Royal Air Inter
ROYAL JET 8200 - King's Flight VIP Aircraft (Jordan)
ROYAL NEPAL - Royal Nepal Airlines Corp.
RYAN AIR - Ryan Air Services, Inc.
SABENA - Sabena World Airlines
SAUDIA - Saudia Arabian Airlines
SAUDIA GREEN FLIGHT - VIP Government Flight
SCANDINAVIAN (SAS) - Scandinavian Airlines System
SEYCHELLES - Air Seychelles
SFACT - (France) Director of Civil Aviation
SHADOW - Air Exel Belgique
SHAMROCK - Aer Lingus - Teoranta
SHARJAH - Sharjah Ruler's Flight
SHEPHERD 1 - Papal Flight
SIERRA HOTEL - Honduras Air Service
SIERRA UNIFORM - Aeroflot
SINBAD - Arab Air Cargo
SINGA - Republic of Singapore Air Force
SISAL - Seychelles International Safari Air, Ltd.
SKYWALKER - General Aerospace, Inc.
SPAR - U.S. Air Force VIP aircraft training flight
SPECIAL - Metropolitan Police Air Support Unit (UK)
SPEEDBIRD - British Airways
SPRINGBOK - South African Airways
STAR CHECK - U.S. Check Airlines
SUDANAIR - Sudan Airways

Doug Smith, W9WI
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Beverage questions

Monte Carroll wrote by email with a few comments and questions about the "Cool Beverage" I described in the January issue of *MT*. "Mine is about 400 feet long and 8 feet high. Wire is individual 22 gauge telephone wire I pulled out and separated. It starts at the shack's second story window, runs out about 200 feet to a volleyball pole, then to a home-made mast another 200 feet further. The ground rod with 470 ohm resistor is next to a creek on the edge of the property. It works quite well, aimed almost northwest like yours."

"What is the purpose of the coax lead-in? I have the wire coming in directly to the radio and it seems to work alright. Admittedly, I suspect the coax would probably shield it from the RF of the computer here."

Yes, that's the main reason for the coax; to shield against spurious signals. In Monte's case, the near end of the antenna comes directly into the radio room, so there isn't as much spurious pickup as there might be. But I would still recommend using coax for the last 30-50 feet unless you live in an unusually quiet house.

"For grounding on this end, would connecting it to the screw on the AC outlet work as well as an actual ground rod?"

Probably not. I will admit I haven't tried it — even if I had, the results in my house could be very different from those in Monte's, or yours. The center screw in an AC outlet *should* be connected through a ground wire to a ground conductor in your fusebox, and then from there to a ground rod. But, I have seen outlets where it isn't connected at all! Even if it is wired properly, the wire takes the "long way around" to get to ground. A wire going to a ground rod by the shortest route possible is still a better idea. Some hams even lay down ground "radials" (wires laid on, or even buried in the ground).

Monte has used the Beverage with a Radio Shack DX-394 and a GE Superadio. He just wraps the insulated wire around the whip antenna of the DX-394, or connects it directly to the terminal of the Superadio. The "balun" is probably not necessary with these sets, but you're likely to need it with a low-impedance receiver like a ham rig.

The "homemade mast" is an 8-10 foot section of the smallest aluminum conduit available at Home Depot. Monte's mast is transportable — he stuck the conduit in a 5-gallon restaurant pickle bucket lined with vegetable oil, then filled the bucket with concrete. After allowing about 36 hours for the concrete to dry, he removed the bucket (lining it with oil made it easier to get it off) and had a transportable mast. Standoff insulators for the old "twin-lead" TV antenna cable were used to hold the wire at the top of the pole.

Bits and Pieces from Canada

• In March, I reported the filing of applications for digital audio broadcasting (DAB) stations in Toronto. Now, digital radio is coming to another of Canada's largest cities. In early August, applications were filed for digital stations in Montreal. The Canadian Broadcasting Corporation's (CBC) four stations will share a transmitter on 1458.048 MHz, while private stations CKGM-990, CKAC-730, CHOM-97.7, and CITE-107.3 will share one on 1452.816 MHz. Both transmitters will operate at 11.724 kW of power.

• Unfortunately for the DXer interested in listening to Canadian radio, CBC's AM stations in Montreal will probably be off the air by the time you read this. CBL-740 Toronto will probably be off soon, too, if it isn't already. Larry Van Horn reports no signals from this normally dominant station.

FM DXers should note that the CBC seems to have swapped the frequencies of their Montreal French-language FM stations. The "AM network" station that used to occupy 690 kHz will take over the existing transmitter used by the classical-music service on 100.7 MHz. The classical music will appear on the new transmitter on 95.1 MHz. The call letters CBFX-FM have been assigned to the 100.7 MHz transmitter, with the old calls CBF-FM moving to 95.1. A similar swap appears to have happened between the two French stations in Quebec City on 95.3 and 106.3.

By the way, don't expect 690, 740, or 940 kHz to stay silent for long. Applications have already been received for both Montreal stations, and the CBC has placed ads offering to lease the 740 transmitter. There are rumors that the French-language station in Toronto on 860 may also be moving to FM (90.3); Canadians have told me the French-language classical music station currently using this FM frequency showed literally *zero* listeners in the ratings.

One might expect a "domino effect" here. Existing AM stations with lower-power facilities are expected to receive these channels; for example, CFRB-1010 is considered one of the strongest candidates for 740. If CFRB leaves 1010, expect another Toronto-area AM station to bid for the 1010 spot. Three or four AM frequencies *will* go silent in the Toronto and Montreal areas, but they probably won't be the big clear channels.

• Returning to the States... Another expanded-band station has appeared. KBGG-1700 replaces KKSO-1390 Des Moines, Iowa; 1390 is now silent. KBGG carries programming from the Business News Network. Martin Gallas near Springfield, Illinois, and Pat Griffith in suburban Denver have both reported this station (as have a number of National Radio Club members — and yours truly).

I know other readers have been experimenting with Beverage antennas — have you had success with yours? Write me at Box 98, Brasstown NC 28902-0098, or by email at *w9wi@bellsouth.net*.

CANADIAN TARGETS

These Canadian stations should have the strongest signals in the Chicago area, and should be good targets in the rest of the Midwest. Stations marked with an asterisk (*) are moving to FM; you may hear something else from that city on their frequency!

Frequency:	Callsign:	City:
540	CBK (CBC Radio 1)	Regina, Saskatchewan
690*	CBF (Radio Canada)	Montreal, Quebec
740*	CBL (CBC Radio 1)	Toronto, Ontario
800	CKLW	Windsor, Ontario
860*	CJBC (Radio Canada)	Toronto, Ontario
900	CHML	Hamilton, Ontario
940*	CBM (CBC Radio 1)	Montreal, Quebec
990	CBW (CBC Radio 1)	Winnipeg, Manitoba
1010	CFRB	Toronto, Ontario
1050	CHUM	Toronto, Ontario
1550	CBE (CBC Radio 1)	Windsor, Ontario
1580*	CBJ (Radio Canada)	Chicoutimi, Quebec

OUTER LIMITS

THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED

George Zeller
George.Zeller@acclink.com

WBCQ: Pirate Station Goes Legit

Veteran pirate radio legend Allan H. Weiner has commenced broadcasting from **WBCQ,** a new licensed USA shortwave station. Using the formerly traditional pirate frequency of 7415 kHz, the station has been widely heard with its new 50 kW transmitter. This station is an outlet for the formerly pirate **Radio Free New York,** but other paid programming rounds out the schedule.

Testing started on August 20, with regular programming since September. WBCQ's slogan, "The Planet," is evident in its QSL card. Reports with return postage are being verified via 97 High Street, Kennebunk, Maine 04043.

FM Pirate Busts

The FCC continued its policy of active FM micropirate station busts late in the summer. Several Florida pirates and four Cleveland micropirates were shut down, but many dozens of stations remain active across the country. This crackdown has not been evident on the shortwave pirate bands, where activity remains at a brisk level. Meanwhile, dozens of new right wing Orthodox pirates remain active in Israel, despite a Supreme Court ruling that they should be licensed or closed.

Europirate Season

With winter propagation returning, it's time to target Europirate transmitters that can be heard in North America. European DXperts Ranier Brandt and Stefan Prinz note that 3900-3950, 6210-6290, and 11470 kHz have recently been the most active frequency ranges in use. SRS Report Service at **http://www.lls.se/~jal/news.html** is a good web site for recent logging updates. For those with an interest in clandestine radio stations, *Clandestine Radio Intel* at **http://www.qsl.net/yb0rmi/cland.html** remains a tremendous resource.

Shortwave Pirate Activity

Pirates heard by our readers last month all used frequencies within 500 kHz of 6955 kHz, typically from two hours before sunset to at least 0500 UTC. Morning and afternoon broadcasts increase on the weekends. Programming formats and contact maildrops (when known) are listed here.

Betty Boop Radio- Old 1940's Betty Boop and Popeye music is an unusual format. (Providence)

Try 11470 near sunset for Euros like SWRS

Blind Faith Radio- A new one, with a rock oldies format. (Stoneham)
Diana Is Dead Radio- Taste is not a strong point on this Princess Diana memorial station. (none, verifies bulletin logs)
He Man Radio- He Man's parody of the battle of the sexes is a favorite of many. (Blue Ridge Summit)
Jerry Rigged Radio- Like most pirates, rock music is their staple. (Providence)
KCFL- Pat Griffith heard this 1970's WCFL-Chicago memorial station on 1630 kHz. (none)
Lounge Lizard Radio- No other shortwave station programs cocktail lounge vocal music. (Providence)
Mystery Radio- A distinctive instrumental music style continues here. (Stoneham)
Radio Amazonia- This Europirate rocker has regular North American relays. (Wuppertal)
Radio Azteca- Bram Stoker's long-running DX parody station is always hilarious. (Belfast)
Radio Caliente- Normally a South American music station, they now have a North American relay. (Merlin)
Radio Eclipse- A "Don't Worry, Be Happy" interval signal leads to rock and comedy from Steve Mann. (Providence)
Radio Freedom- Their powerful signal during tests promised Labor Day shows, but holiday activity was sparse. (Unknown)
Radio Garbanzo- Fearless Fred's original gut-splitting humor is highly entertaining. (Belfast)
Radio Inca- This new parody shows promise, with South American and Central American music. (Providence)
Radio Metallica- Dr. Tornado's 10 kW powerhouse frequently comments on President Clinton's sexual behavior. (Blue Ridge Summit)
Radio Nonsense- Joe Mama's rock is spiced with comedy sketches. (Belfast)
Radio Tornado Worldwide- This parody station plays actual voice clips from Radio Metallica. (none)
Radio Xanax- Science fiction drama and related music come from this unusual one. (Stoneham)
RFM- H. V. Short's veteran rock and comedy sketch station is active again. (Belfast)
SWRS- Their 11470 kHz signal is the best heard Europirate in North America. (Wuppertal)
Tangerine Radio- Raunchy Rick's anarchist station, originally from the 1980's, is making a comeback. (Belfast)
Voice of Laryngitis- Veteran 1980's pirates Genghis and Stanley Huxley (with Arty the barking seal) are back with new comedy! (Belfast)
Voice of the Pig's Ear- An active new one with rock and "radical" right wing advocacy. (none)
Voice of the Raving Lunatic- With only one show so far, we await further developments. (none, but verifies bulletin logs)
Voice of the Rock- They use a low power "Grenade" transmitter from an island off Boston. (Providence)
WARR- Captain Nobeard's shows are similar to the WEED format. (none active)
WBIG- Big Mike specializes in hard rock tunes. (Belfast)
WEED- Johnny Smoke's marijuana advocacy is always a slick production. (Huntsville)
WHYP- A memorial to local upstate New York broadcaster James Brownyard. (e-mail via **whyp1530@yahoo.com**)
WLIS- Jack Boggan's interval signals regularly appear in the pirate band. (Blue Ridge Summit)
WMFQ- This one promotes the QSL process in a profane way. (Providence)
WRYT- Rock and easy listening music plus TV theme songs are heard here. (Belfast)
WSRR- Dr. Love normally broadcasts a soul music playlist. (Belfast)
WUNH- Rockabilly and Do-Wop oldies have been recently featured. (Providence)

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign addresses. Send your letters to PO Box 1, Belfast, NY 14711, PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 146, Stoneham, MA 02180; PO Box 11522, Huntsville, AL 35814; PO Box 293, Merlin, Ontario N0P 1W0; and PO Box 220342, Wuppertal, Germany.

Thanks!

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We appreciate material sent in this month from: John T. Arthur, Belfast, NY; Shawn Axelrod, Winnipeg, Manitoba; Ranier Brandt, Hoefer, Germany; Ross Comeau, Andover, MA; Joe Filipkowski, Providence, RI; Harold Frodge, Midland, MI; Paul Griffin, San Francisco, CA; Pat Griffith, Federal Heights, CO; Rich and Talea Jurrens, Katy, TX; Kevin Klein, WI; Michael Lehane, Lakeland, FL; Zacharias Liangas, Italy; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Dave Maxwell, Toronto, Ontario; Bill McClintock, Minneapolis, MN; Gary Neal, Sugar Land, TX; Pat Nobel, Toledo, OH; Dick Pearce, Brattleboro, VT; Stefan Printz, Ytterby, Sweden; Al Quaglieri, Albany, NY; Jesse Rose, Hampton, VA; Randy Ruger, West Hollywood, CA; Martin Schoech, Merseburg, Germany; Ed Schwartz, Chicago, IL; Dick Seggelin, Whitman, MA; H. V. Short, MA; Lee Silvi, Mentor, OH; DJ Stevie, Basel, Switzerland; Allen H. Weiner, Kennebunk, ME; Jeff White, Miami, FL; Niel Wolfish, Toronto, Ontario; and David Zantow, Janesville, WI.

Kevin Carey, WB2QMY
lowband@gateway.net

Tips from Our Readers

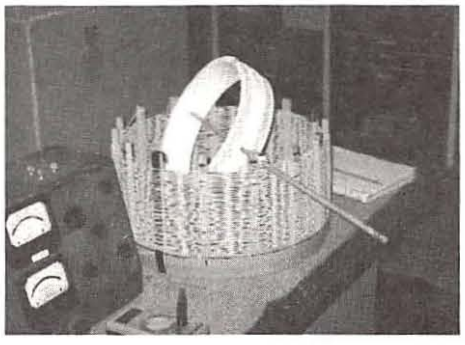
This month we'll share an assortment of tips and reader loggings, many of which weren't included recent columns because of space limitations. In the process, you'll hopefully be inspired to tune into the low bands during this season of rapidly improving conditions. November, in fact, often marks the beginning of the year's best DX reception.

• Speaking of DX, this a good time to review the basics for hearing **European low frequency (LF) broadcasters** in North America. The first rule for success is to have a path of darkness between you and the transmitting station. This means tuning from dusk until about 1 a.m.

If you live near the East Coast, you have the best chance at hearing these stations, but they have also been copied from listeners much farther inland. Even if a station is not strong enough to hear clearly, you may be able to detect its presence by turning on your receiver's single sideband/beat frequency oscillaotr (SSB/BFO) switch, and listening for the telltale whistle of its carrier.

An excellent tip for DXing these stations was given by Paul Ormandy of the New Zealand Radio DX League via the Internet. He suggests programming the standard longwave (LW) broadcast frequencies into your receiver's memory channels to simplify tuning. With this method you can do a complete check of the band in a very short time. The standard frequency assignments are: 153, 162, 164, 171, 177, 180, 183, 189, 198, 207, 216, 225, 227, 234, 243, 252, 261 and 270 kHz. Keep an ear on 252 kHz for one of the more colorful stations on the band — Atlantic 252 of Ireland.

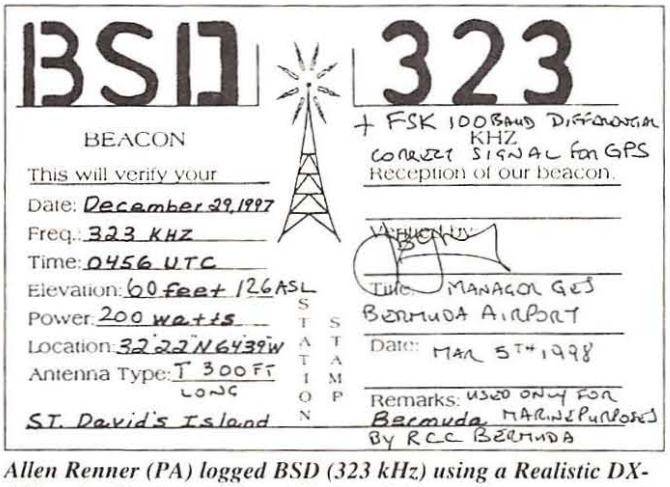
• **Litz Wire** - Seasoned LF experimenters know the magic of Litz wire. This multi-conductor wire, composed of separately insulated strands, allows you to build coils of superior Q and efficiency. We mentioned Litz wire briefly during the Lowfer transmitter series (June 98 through August 98 *MT*),



but I also mentioned that locating this wire could be a real challenge.

We now have at least one supplier to announce. New England Electric Wire Corporation, located in Lisbon, New Hampshire, offers several types of Litz wire and offers a fine color catalog describing their wares. Especially interesting is a write-up describing how Litz wire gets its name and how it works to maximize efficiency in inductors. An in-depth technical brochure is also included that lists the physical parameters of Litz wire and shows the recommended frequency range for all types. To get a copy of the catalog, call the factory at (603) 838-6625 or e-mail them at *sales@neewc.com*.

• Litz wire is a natural choice for **LF loading coils**. Above is a high Q coil built by Bill Bowers (OK) for use on the license-free Lowfer band (160-190 kHz). The coil form is made from the base of an old sprayer bottle measuring about 19 inches in diameter.



Allen Renner (PA) logged BSD (323 kHz) using a Realistic DX-440 and a Homespun Loop. Nice catch!

• We have numerous **loggings** this month from two long time *MT* contributors-Dick Pearce (VT) and Allen Renner (PA). Several of the beacons listed are outside the U.S. and Canada, and would make excellent DXing targets as the cooler weather sets in. Let me know what you're hearing! Send your favorite loggings (and photocopies of QSLs) to: Below 500 kHz, P.O. Box 98 Brasstown, NC 28902. Be sure to take some time out from monitoring to enjoy the Thanksgiving season with family and friends.

SELECTED BEACON LOGGINGS

Freq.	ID	Location	By
216	CLB	Carolina Beach, NC	(D.P.-VT)
224	MO	Moosonee, ONT	(D.P.-VT)
224	VWD	West Dover, VT	(A.R.-PA)
230	QB	Ste. Foy, QUE	(D.P.-VT)
232	GP	Gaspe, QUE	(D.P.-VT)
238	MMK	Meriden, CT	(D.P.-VT)
250	YTJ	Terrace Bay, ONT	(D.P.-VT)
251	MVM	Machias, ME	(D.P.-VT)
257	TBY	Waterbury, CT	(D.P.-VT)
258	ZSJ	Sandy Lake, ONT	(D.P.-VT)
254	5B	Summerside, PEI	(D.P.-VT)
260	YAT	Attawapiskat, ONT	(A.R.-PA)
266	YZX	Greenwood, NS	(D.P.-VT)
268	VKN	Mt. Mansfield, VT	(D.P.-VT)
300	BHN	Barahona, DOM	(A.R.-PA)
323	BSD	St. David's Head, BER	(A.R.-PA)
330	BH	Bar Harbor, ME	(A.R.-PA)
338	MRK	Rayville, LA	(A.R.-PA)
353	JUK	McKinnon, GA	(D.P.-VT)
353	HOT	Higuerote, VEN	(D.P.-VT)
353	HOT	Higuerote, VEN	(A.R.-PA)
353	LI	Little Rock, AR	(A.R.-PA)
354	SP	St. Pierre Island, SP	(D.P.-VT)
360	KIN	Kingston, JAM	(A.R.-PA)
362	LYL	Lima, OH	(D.P.-VT)
365	CZM	Cozumel, MEX	(A.R.-PA)
369	ZDX	St. Johns, ANT	(D.P.-VT)
369	ZDX	St. Johns, ANT	(A.R.-PA)
374	SA	Sable Island, NS	(D.P.-VT)
379	BRA	Broad River, NC	(D.P.-VT)
380	UCY	Cayojabo, CUBA	(A.R.-PA)
382	BT	Unidentified	(D.P.-VT)
388	RNW	Washington, NC	(D.P.-VT)
391	DDP	San Juan, PR	(D.P.-VT)
392	VEP	Vero Beach, FL	(A.R.-PA)
401	YPO	Peawanuck, ONT	(A.R.-PA)
402	SJE	San Jose del Guaviare, COL	(A.R.-PA)
404	Y	North Bay, ONT	(D.P.-VT)
404	IUB	Baltimore, MD	(D.P.-VT)
412	CTZ	Clinton, NC	(D.P.-VT)
415	ASJ	Ahoskie, NC	(D.P.-VT)
415	HJM	Bonham, TX	(A.R.-PA)
417	HHG	Huntington, IN	(D.P.-VT)
423	CKP	Cherokee, Iowa	(A.R.-PA)
426	FTP	Fort Payne, AL	(D.P.-VT)
428	COG	Orange City, VA	(D.P.-VT)
450	PPA	Puerto Plata, DOM	(D.P.-VT)
450	PPA	Puerto Plata, DOM	(A.R.-PA)
515	RRQ	Rock Rapids, IA	(A.R.-PA)
530	F9	Chatham, NB	(A.R.-PA)

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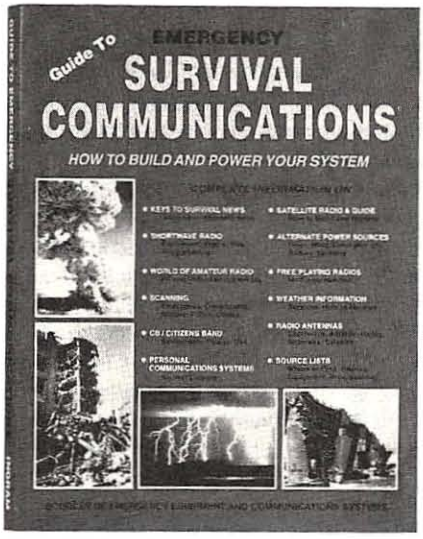
"Survival Communications" also covers building and using inexpensive satellite radio systems that can be powered by alternate power sources, solar, wind, generator, or battery systems.



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Rich Arland, K7SZ
k7sz@juno.com

An affordable restoration: Heathkit's GR-64

After several years of restoring older, tube-type radio gear, called Boatanchors or "BAs" by those in the craft, one thing has become obvious: prices on tube gear have risen to astronomical heights. Collins, Drake and select Hallicrafters sets now bring top dollar, with prices occasionally becoming so outrageous that many of us wonder how anyone can afford to participate in this facet of the radio hobby.

Take heart! All is not lost. Every hamfest will turn up a few entry level shortwave (SW) sets of the '50s and '60s that make great restoration projects for the neophyte. About two years ago, I was prowling a fleamarket and found a Heathkit GR-64 SW receiver for $20. Shades of the past! I built a GR-64 in my college days and used it in my dorm room for several years. I decided that this receiver would make a great restoration project.

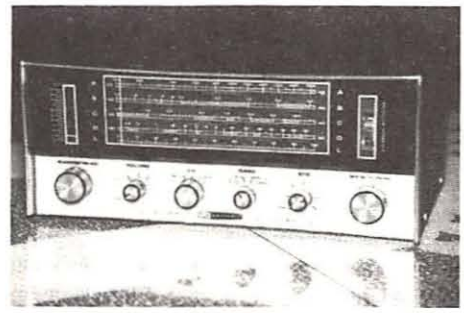
The GR-64 is Heathkit's low-end entry into the general coverage SW field from the mid-'60s. The four tube design, featuring a 12BE6 mixer/local oscillator (LO), 12BA6 intermediate frequency (IF) amplifier/beat frequency oscillator (BFO), 12AV6 detector/audio amp, and a 12AQ5 audio output, is straightforward and is easy to troubleshoot.

A thorough visual inspection of the receiver, concentrating on burned, charred, or missing components, modifications, blown fuses or obvious signs of tampering is a must. Don't let your desire to apply power overshadow a good technical approach to making sure your receiver is free from obvious problems. Be very observant and look for "mods," extra switches, parts and wiring, as these sets were excellent candidates for experimentation by those of questionable electronics background.

Go by the book

A manual is a necessity at this point. Heathkit has recently started furnishing photocopies of their manuals for a nominal cost. Other sources of manuals are hamfest flea markets, Heath collectors on the Heathkit reflector (*heathkit@qth.net*) on the internet, A.G. Tannenbaum's in Ambler, Pennsylvania, or W7FG Manuals [1,2].

My unit played from the start but the AC hum from a bad filter cap all but masked the receiver audio. A quick trip to the junque box yielded a replacement and the hum disappeared.



My $20 fleamarket find turned out very nice after a lot of electronic and cosmetic clean up. This mid-60s entry level SW receiver is a very good first project for those inexperienced in radio restoration. It looks good and plays well, too.

Although my GR-64 worked, it did not work well. The receiver tended to squeal when tuned to a strong signal and the BFO was nonfunctional. First order of trouble shooting: take a close look at the circuit board and switch wiring and compare it to the pictorial diagrams and schematic in the GR-64 manual. *Boy*, did I find some differences!

R-5, the 12k ohm screen resistor for V1, the 12BE6 oscillator/mixer, had burned open. A previous owner of the radio did not bother to find out the proper value of R-5 and slapped a 1k ohm resistor from the screen of V1 to B+ line, placing almost 220 Vdc on the screen of V1 which was only supposed to have 90 Vdc! Not only did the poor receiver oscillate intermittently, the audio sounded horrible.

R-5 was replaced with a 12k ohm, 1/2 watt resistor and the oscillation problem disappeared. Voltage measurements on each tube socket were completed and compared to the schematic. If the proper voltages (+/- 10%) are not present on the various tube pins, then the set will not work properly.

In my instance, R-21, a 3.3 Meg resistor in the automatic gain control (AGC) line, was found to be grossly out of tolerance and was replaced. (Note: it is *not at all* uncommon to find carbon resistors in older sets as much as 300% out of tolerance! If your voltage measurements are off, start checking the carbon resistors.)

After replacing several caps and resistors, it was on to cleaning up the messy solder connections on the printed circuit (PC) board. This requires a lot of patience and solder wick. The object is to remove excess solder from the PC board which will eliminate any cold solder joints caused by poor soldering technique: the leading problem with Heathkit and Knightkit radios.

Alignment techniques

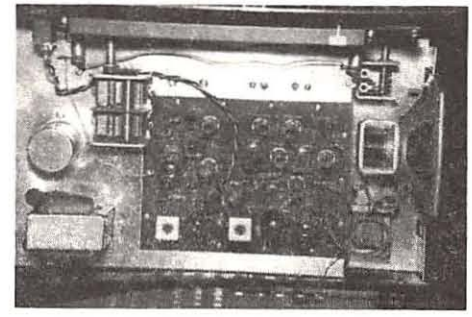
Once the board is cleaned up and the set is checked for proper operation, you will need to align the radio frequency (RF), IF and LO stages to get the receiver up to speed. An IF alignment is simple; not so for the RF and LO sections of the receiver.

It is possible to do an IF alignment without a signal generator. This procedure involves tuning the set to a weak signal and then peaking the IF cans (normally these cans have a top and bottom slug adjustment) for peak AC voltmeter indication. (The AC voltmeter is connected across the speaker output.) This is not the best method, but it will suffice in a pinch. Once the IF is peaked, it is on to the RF and LO alignment.

A word of caution. If you do not have the necessary equipment or experience to properly align a shortwave receiver (good quality RF generator, frequency counter, AC voltmeter or oscilloscope), then please do not try. Find some ham radio operator or adroit SW listener in your area to help you with the alignment. You can really do more harm than good at this point, if you do not have the necessary experience and tools to do the job correctly.

If you are still game, then let's continue with the rest of the receiver alignment. Hook the RF generator to the antenna input on the

This shiny interior looks very clean, but it sure didn't start out that way! Lots of elbow grease and liquid brass polish cleaned up the PC board better than new!



receiver (or follow whatever hookup procedure your manual calls for). Use the frequency counter to accurately set the RF generator's frequency as called for in the alignment instructions.

In order to get the stations to appear at the proper frequencies on the receiver dial, you first start at the low end of the dial on each band and set the LO *coil* for zero beat with the RF generator, which is also tuned to the low end of the dial. Next move the dial and generator to the upper end of the band and adjust the LO *capacitor* for zero beat. Repeat the procedure several times to get the LO tracking in a linear manner across the entire band (this sets where the stations appear on the dial in relationship with the dial markings). LO alignment is required on each band of a multi-band receiver. *Note*: some simple SW receivers have only one LO adjustment for the top end of each band.

Once the LO is tracking properly, then adjust the receiver RF and antenna coils on each band for maximum signal on the scope (which is placed across the audio output transformer). In all instances, you *must* keep the output of the RF generator as low as possible in order to avoid overloading the receiver and causing misalignment problems. After completing the alignment you should find your newly refurbished receiver will play quite well.

Final touches

Cosmetic cleanup can be done in stages. Do be mindful not to use aggressive chemical cleaners on front panels with silkscreened lettering or on glass dials that have painted lettering. Murphy's Oil Soap or regular dish detergent, diluted 1:4 with water, will clean up the majority of stains, grime and grunge you encounter. If you must use something more aggressive, like Simple Green or 409, try it on a portion of the chassis or case that won't normally be visible to the casual eye, just to make sure that it does not attack the paint or crinkle finish. Don't forget to rinse thoroughly in clean water to remove any chemical residue from the cleaning solutions.

Clean knobs using a very weak solution of dish detergent and a toothbrush. Don't soak the knobs in the solution, as sometimes this will discolor the knob inserts. Use the toothbrush to get the grit and grime out of the splines on the knobs. Rinse in clear water.

If you take your time, you can take a flea market find and turn it into a vintage radio treasure. By concentrating on the low end SW and ham receivers of the '50s and '60s, it is possible to enjoy the radio restoration hobby at a nominal cost. If you want more reading, try these titles, available from Antique Electronics Supply or Antique Radio Classified[3]: *Radios by Hallicrafters* by Chuck Dachis, *Old Time Radios! Restoration and Repair* by Joe Carr, *Fixing Up Nice Old Radios* by Ed Romney, *Heathkit - A Guide to the Amateur Radio Products* by Chuck Penson, *The Zenith Trans-Oceanic* by Bryant & Cones (also available from Grove). And remember: **K**eep **I**t **S**imple.

FOOTNOTES:

1. A.G. Tannenbaum: PO Box 386, Ambler, PA 19002 TEL: (215) 540-8327. Web URL: www.agtannembaum.com E-MAIL: k2bn@agtannenbaum.com
2. W7FG Vintage Manuals: 3300 Wayside Dr., Bartlesville, OK 74006 TEL: (800) 807-6146 FAX: (918) 774-9180 Web: http://www.w7fg.com E-Mail: w7fg@w7fg.com
3. Antique Electronic Supply: 6221 S Maple AVE, Tempe, AZ 85238 TEL: (602) 820-5411 FAX: (620) 820-4643. Antique Radio Classified: P.O. Box 2, Carlisle, MA 01741 (free sample magazine)

Bill Cheek
email: bcheek@cts.com

Automatic NiCd Cell Recharger

Learn something new, and you just never know what will come next. Last month, Judy May asked about a design for an automatic discharger circuit for NiCd and NiMH cells. A simple op-amp voltage comparator worked well for the job. The other day, when wondering what the heck to write about this month, I suddenly realized — that same circuit, slightly revised, could become an automatic *RECHARGER*. Comparators are versatile. They always intrigued me, even back in the olden days when the transistor version was the size of a cigar box. Now they come on tiny chips. Geez ...

NiCd/NiMH Cell Basics

A NiCd/NiMH cell is considered fully discharged when its terminal voltage drops to 1.0 V. A new cell is fully charged when the terminal voltage reaches 1.40-1.44 volts. Halfway between at 1.2 V is considered the "nominal" voltage rating.

As a cell ages, its full recharge level declines. When a cell can't recharge above 1.2 V, it's considered to be "used up" for all practical purposes. So long as a cell can reach a terminal voltage of 1.35 V or greater, it's in great shape. When it can't recharge above 1.30 V, better jot it on your shopping list.

Rechargeable cells come in a variety of **sizes** and **ratings**, from Type N and AAA to D and larger. Portable radios usually take the AA size, for which several capacities are available. The cheapest AA cells come in at about 450-mA/h, with the median at 600-mA/h ("mA/h" stands for milliampere-hours: how many milliamps a cell can be expected to generate for a period of one hour). Heavy-duty AA cells start at 800-mA/h with 1000-1200-mA/h at the top. 600-mA/h cells offer about 33% more time between recharges.

The life of a cell is generally proportional to the number of times it is recharged, so it makes sense to buy higher capacity cells, so long as the percentage of extra "life" is greater than the percentage of extra cost. Usually it is.

A 600-mA/h cell should produce 600-mA for one hour before it fully discharges to 1.0 V. If a cell is either discharged or recharged at the actual mA/h rating, its life will be significantly shortened due to accumulated heat within the cell.

"mA/h" is also called "C." The maximum safe rate of discharge (and recharge) is considered to be one-third the mA/h rating, called the "C/3" rate. Thus, the C/3 of a 600-mA/h cell is 200-mA/h. A 600-mA/h cell can be expected to generate 200-mA for a period of three hours; 100-mA for six hours; and 50-mA for 12 hours, etc., without unduly jeopardizing the life expectancy.

Clearly "less is more" with rechargeable cells. They last longer when slowly discharged and recharged. Trouble is, we want our rechargeable cells to last for days, and to recharge in a minute. No way, Bunky! Be leery of "fast recharges." Sure, you can recharge a cell in less time, the more current you pump through it; but if it gets even warm to the touch, the damage is done. And it *will* get warm with discharges or recharges higher than the C/3 rating, so beware!

NiCd and NiMH cells can be recharged indefinitely at a rate of one-tenth the mA/h rating (i.e., C/10), without appreciably jeopardizing the life expectancy. Thus, a 600-mA/h cell can be left on recharge at 60-mA or less without concern.

Recharging Basics

Real-world efficiency is never 100%, so if it takes 10 hours to discharge a cell at its C/10 rate, it will take appreciably longer at that rate to fully recharge, typically about 14 hours. (Now you know why there is a market for "fast rechargers"!) Fourteen hours is an awfully long time to twiddle your thumbs.

While it is best to recharge NiCd and NiMH cells at the C/10 rate, you can "fast charge" them at the C/3 rate in about five or six hours without too much concern. Caution is advised, because there is little difference between 190-mA and 210-mA. It's best to recharge at well under the C/3 rate.

Even if the rate of recharge is under C/3, you will have a problem if the cell's terminal voltage is allowed to exceed the maximum of 1.44 V. At the C/10 rate, this isn't likely, but it could easily happen at C/3. Voltage limiting is required when the cell's terminal voltage reaches 1.44 V. That, or the charge current must be switched off altogether. Forewarned is forearmed.

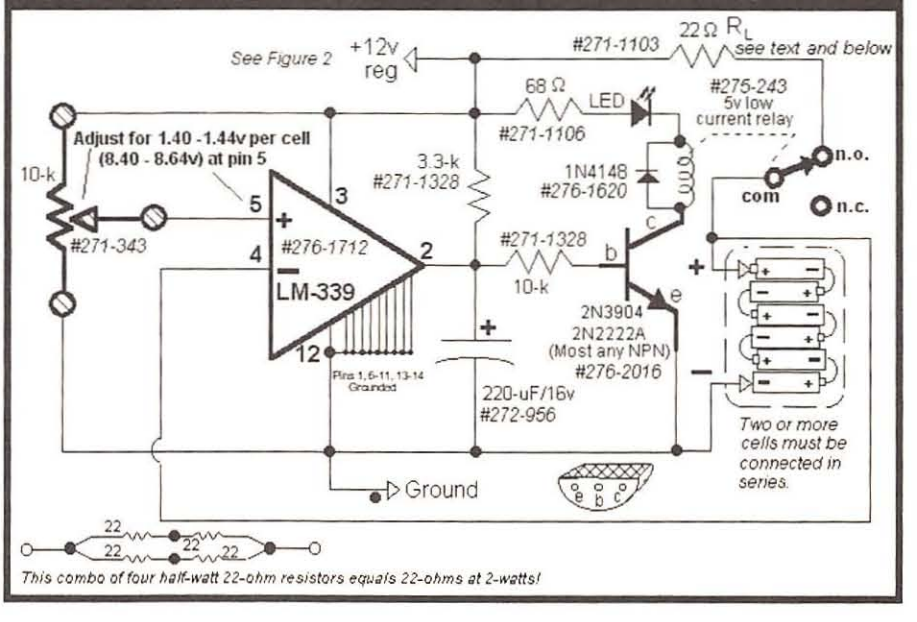
The Automatic Recharger

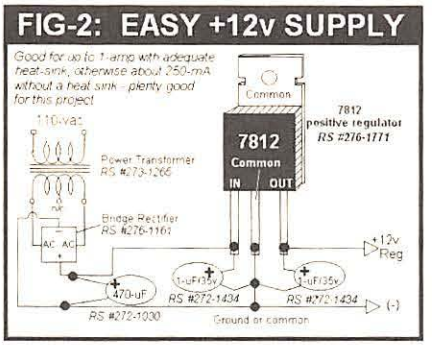
This experimenter's design is for rechargeable battery packs that contain one to six cells. We'll apply the bulk of last month's project to an automatic recharger that won't overcharge valuable NiCd or NiMH cells. Figure 1 shows the schematic diagram with Radio Shack part numbers. You can "breadboard" this circuit in a few minutes or build it on a piece of perfboard in about an hour.

Very little is critical about the circuit, but all leads should be short and the pin 2 output side of the circuit must be physically isolated from the pins 4 and 5 input side. The 220-µF/16 V capacitor can be larger (up to 1000-µF); but must not be a lesser value.

This circuit requires regulated 12 volts: a circuit for which is given in Figure 2. You can use any regulated 12 V or greater so long as the current rating is about 300-mA or more. If the regulated voltage exceeds 12.0 V, you'll have to increase the values of the 22-ohm and 68-ohm resistors. See "calculations" ahead.

FIG-1: AUTOMATIC RECHARGE LIMITER





Circuit Discussion

The heart of the automatic recharger is the LM-339 comparator (see pinout in Figure 3 and last month for more information). The business-end of the recharger is the 10-kΩ potentiometer that sets the drop-out voltage. To set it correctly, first determine the number of cells in your rechargeable pack. Multiply 1.40 by the number of cells. For six cells, it's 1.40 x 6 = 8.40 V. Connect a voltmeter between ground and pin 5 of the LM-339, and set the potentiometer for a reading of 8.40 V. You can also use 1.44 V x 6 = 8.64 V, for a range of 8.4 - 8.64 V. Anywhere within that range will be fine.

The terminal voltage of the pack is fed back to pin 4 of the comparator. When this level rises to the reference setting at pin 5, the comparator's output goes low, and turns the transistor off. This de-energizes the relay and stops charging the pack.

Calculations

The 10-kΩ potentiometer sets the maximum voltage to which the pack can be recharged. The 22-ohm resistor is the current limiter, and is given solely as typical. You should calculate the precise value for that resistor, based on your power supply; the mA/h rating; and the number of cells in the pack. Let's assume 12 volts and a 6-cell, 600-mA/h pack.

First, we know that 1.44 V per cell is maximum, so 6 x 1.44 = 8.64 V. We also know that the maximum current is 200-mA/h (C3). So we want that resistor to drop the excess voltage above 8.64 V and limit the current to (C3) 200-mA, max. Ohm's Law says current equals voltage divided by resistance (I = E/R):

0.200 = (12.0 - 8.64)/R
R = (12.0 - 8.64)/0.200
R = 3.36/0.200 = 16.8 ohms

You could use two half-watt 33-ohm resistors in parallel for 16.5-ohms. But that's pushing it. I chose 22-ohms because: I = E/R = 3.36/22 = 150-mA, a much safer value, you see, because it's less than the C3 rate.

Consider a discharged pack at 1.0 V per cell x 6 cells = 6 V. That resistor will drop the excess 6 volts. Again, Ohm's Law: I = E/R = 6/22 = 272-mA, the initial charging rate, which even though 22-ohms, exceeds the C3 rate. Not to worry: as the pack builds a charge, the excess voltage drops, which causes the current to drop. A safe level is quickly reached, well before heat builds up inside the cells. 22-ohms is about right for a 600-mA/h 6-cell pack.

See last month's column for how to calculate values of resistance in parallel (they're directly additive when in series). You have to account for the power that's consumed by the resistor. Assume 250-mA through 22-ohms, and use Ohm's Power Law: $P = (I^2)(R)$, to find $P = (.250^2) \times 22 = 1.375$ watts!

If you use a half-watt 22-ohm resistor, it might burn up before the current drops! A one-watt resistor might be okay, but let's make a 2-watt 22-ohm resistor with four half-watt 22-ohm resistors, wired as two in series, paralleled with an identical series pair. See the lower left corner of Figure 1. Three 82-ohm resistors and one 100-ohm resistor, all four wired in parallel, will yield about 22-ohms, too.

Increase the value of the 68 ohm resistor to 100-ohms for a 13.8 V regulated supply, and a 100-ohm resistor in series with a 15-ohm resistor (115-ohms) for a 15 V regulated supply.

Oddity and Caveat

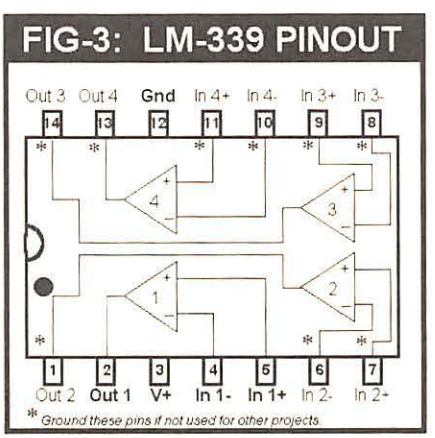
I didn't have the time to investigate, but my test circuit slowly pulses (turns on and off) as the battery pack reaches the drop-out point. I didn't sweat it because this pulsing is okay in the sense that it safely keeps the pack fully charged until you remove it. Kind of cool, actually, but if any of you op-amp wizards know about the phenomenon called "hysteresis" (which is what I think this is), clue me in so I can pass it on.

This is an experimenter's circuit. It is not intended, nor should it be trusted as an optimum recharger for NiCd and NiMH cells. Its primary purpose is as a learning aid for op-amps and comparators.

Support

Support for this and all my columns is freely available by e-mail (note the change!) If you're not computerized, please include an SASE with any postal requests.

E-mail: bcheek@cts.com
WWW: http://ourworld.compuserve.com/homepages/bcheek
FAX: (619) 578-9247 anytime
Postal: PO Box 262478; San Diego, CA 92196-2478



Clem Small, KR6A

Why All the Noise about Noise?

If you do much reading about radio operations you often come upon the topic of noise. A great deal of time and effort is expended by radio operators and radio design engineers working to reduce noise in radio reception. Unfortunately there is no way at present to entirely prevent noise from entering our receiving systems; some is generated within the receiver itself, and some is received via the antenna.

This month we take a look at noise and some things we can do to minimize its effect on our communications.

The Masking Bandit

Perhaps you have been in a situation where the sound level was so high that you could not hear a person talking to you even though they were standing right beside you. One such experience that comes to mind is standing beside Niagara Falls with its thunderous bedlam of sound.

When a higher-intensity sound renders another sound inaudible we say that the higher-intensity sound has masked the less intense sound. Electrical noise of sufficient strength can mask received signals of lesser strength just as Niagara's roar can mask the sound of a person's voice.

Internal Noise

In a receiver, the circuit which is connected to the antenna is called the "first stage." This first stage almost always contains an amplifying device such as an integrated circuit (IC), transistor or vacuum tube. These devices (IC, transistor, tube) generate electrical noise as they operate. This internally-generated noise is capable of interfering with, or completely masking a weak signal.

Because the noise from the first stage is amplified by all following stages it becomes so strong that it essentially determines the overall level of internal noise (IN) generated by the receiver. Stages following the first stage — because they are followed by fewer stages to amplify their noise output than is the first stage — do not usually contribute significantly to the overall IN level.

External Noise

External noise (EN) is noise which enters the receiver from the antenna system. Sources which send electrical noise as radio waves to your antenna include electrical machinery, auto ignition systems, lightning bolts from near or afar, and extra-terrestrial sources such as the sun, other sources in our own galaxy, and beyond. The effect of EN on reception varies from no effect at all (for strong received-signals with little EN present) to rendering communications completely impossible (for weak radio signals competing with strong EN levels).

EN was even more of a problem in the early days of radio when receiver passbands were wider, and effective (sometimes) noise-reduction circuits were not yet developed. Lee DeForest, the self-styled "Father of American Radio," was so frustrated by EN at times that he termed it that "godawful" noise. Whatever we call it, EN can be totally disruptive to radio communications at times.

Internal Noise vs. External Noise

On the HF band and lower in frequency, EN is usually the limiting factor in communications (see fig.1). The strength of EN on these lower bands is high enough that radio designers are not usually concerned with designing the lowest-noise front end practical. As long as the IN is lower than the EN the noise with which the received signal competes is the EN. In this case, the lower strength IN has essentially no effect on the ratio of signal to noise in reception.

On the VHF band and higher (above 30 MHz) EN is generally so low (fig. 1) in strength that IN assumes great importance. At these higher frequencies IN is usually the limiting factor in receiver sensitivity, and so receivers are designed with the lowest IN practical.

HF High Frequency (3-30 MHz)
VHF Very High Frequency (30-300 MHz)
UHF Ultra High Frequency (300 MHz-3 GHz)

Try the following test. Turn on both your HF receiver and VHF (or UHF, ultra high frequency) receiver with good antennas attached. Tune each receiver to a frequency with no signals present. Turn off any squelch controls and set any radio frequency (RF) gain controls to maximum. Adjust the volume controls such that you hear a moderate level of noise from each receiver. Now connect and disconnect the antenna to each set.

For the HF receiver, noise will generally significantly increase as you connect the antenna, but for the VHF receiver, connecting and disconnecting the antenna should make essentially no difference in the noise level you hear from the receiver. The noise you hear from the HF receiver obviously comes mainly from the antenna. Noise heard on the VHF set is obviously IN.

So What Do We Do?

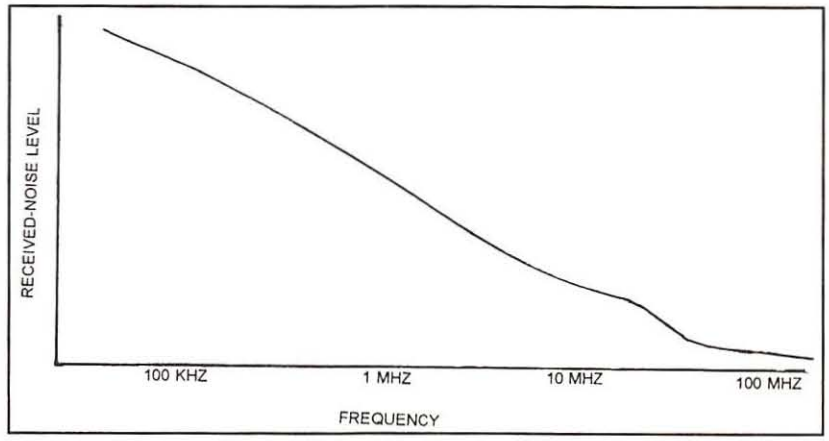
We combat noise in various ways. The most simplistic solution is to listen only to strong signals where noise is not such a problem. But we often want to hear what that weak DX station is saying, and so we do our best to reduce the effects of noise on our reception.

For VHF and above, our squelch control is one means of avoiding the nuisance of listening to IN. At these frequencies using a receiver with a very-low noise front end is also usually desirable.

For HF, some of the relatively common techniques are the use of noise limiters, noise blankers, and also noise reduction units which use a separate antenna. Limiters, blankers and reduction units are quite helpful with certain kinds of noise, particularly impulse noise such as auto ignition interference. Unfortunately none of these devices will really quiet all types of noise.

Another approach is to find the source of noise and get it

Figure 1. Received noise generally decreases with increasing frequency.



stopped. For locally-generated noise this is sometimes possible with a direction-finding receiver. If the source is a leaky insulator on a power pole, the utility company is often helpful in clearing it up. If it originates in some faulty appliance in the neighborhood that neighbor may be open to suggestions for reducing the noise by methods such as those suggested in the *ARRL Handbook*, or *ARRL Interference Handbook* (both available from Grove Enterprises).

Yet another approach is to utilize antennas which offer some amount of noise rejection. Most man-made noise seems to be vertically polarized, so using a horizontally oriented antenna is often helpful. Loop antennas, quad antennas, and underground antennas (yes, they work to a limited extent) are known for their quiet, somewhat noise-free operation. I've also read suggestions that a metal shield (Faraday cage) be put around small antennas to eliminate the electrical component of the signal. This leaves the signal's magnetic component, which is usually less noisy than the electrical component.

Beam antennas also are helpful in reducing noise due to their increased responsiveness in just one or two directions and reduced responsiveness in other directions. When the beam is directed toward the signal of interest that signal is emphasized: Noise and interference from other directions are minimized. As long as the direction of the desired station doesn't include excessive noise, then the overall response is a reduction in received noise as well as an increase in the strength of the desired signal.

RADIO RIDDLES

Last Month:

I asked "Where did we get the name 'antenna?'"

In the early days of wireless our skywires were called "aerials." This was appropriate because they had to be high in the air which is, of course, the meaning of the term "aerial." But as technology developed, receivers became more sensitive, and it was possible to receive with tiny antennas which might be on your desk top rather than high in the air. Therefore, a term which was more descriptive was desirable.

"Antenna" (the organ through which insects receive information from the environment around them) was chosen as a more appropriate name for the device through which a radio receives information from the environment around it.

This Month:

What is a sferic? It is related to what we discussed above.

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. 'Til then, Peace, DX, 73

Ike Kerschner, N3IK

Wish List for a Ham's Christmas

Every November I compile a list of neat gift ideas for hams. This year's list includes a few sleeper items that are really worthwhile!

Wish number one is a new book by Dave Ingram, K4TWJ called ***33 Simple Weekend Projects***. All of the projects described are really simple and worthwhile for the average ham.

I particularly like the section on HF antennas; Dave shows how to build five simple and effective antennas. One, "the modified Bobtail" is really a super DX antenna: I built one for 30 meters, and it consistently outperforms my loop on DX by a wide margin. Another (a Bruce Array) looks like a winner and should be on the air from this location on 17 meters by the time this is in print.

The chapter on theory is nicely laid out and allows the novice to grasp the general idea of how electronics works and just exactly what the various components are and how they are used.

Other chapters cover VHF, Mobile, and Home Station. Some of the projects described in these chapters are: using your VHF HT to work CW through the satellites, building and using two QRP transmitters, a classic radio transmitter, proper grounding of your station, restoring old receivers and transmitters, telegraph systems, building a soil tester and, best of all, an electric wiener roaster!

I am having a lot of fun with this book and am sure you will, too. Price is $15.95 from *CQ Magazine*, phone 1-800-853-9797.

How to Use The Amateur Radio Satellites by Keith Baker, KB1SF, is the most comprehensive and easy to understand manual on using the various satellites I have ever seen. If you have any interest in satellite communications this is the first book you should obtain. Complete information on each usable amateur satellite is included. Details on working the shuttle and Mir are also in this nifty little 32 page manual.

How to Use the Amateur Radio Satellites is available from AMSAT, 850 Sligo Avenue, Suite 600, Silver Spring, MD 20910-4703 for a donation of $5.00.

The Bozak Antenna - While at the Boxboro, Massachusetts, hamfest I came across a great buy on a two meter base station antenna. This 5/8 wave over 5/8 wave antenna provides six dB of omnidirectional gain. And for the price, it is the best built base station antenna I have ever seen. The unit is fully fiberglass enclosed and uses all stainless steel hardware, looks great, and is really built to last. In fact most of us would call this antenna a work of art.

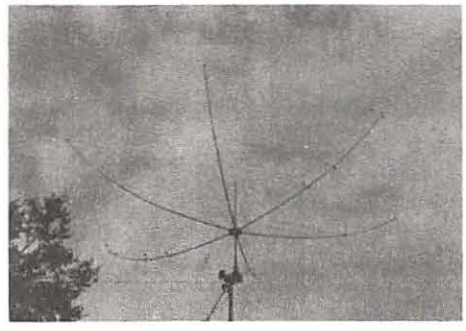
The Bozak antenna is available in two configurations The 6 dB unit we just discussed, and a 5/8th wave 3 dB unit. The Bozak antenna can be had for 2 meters, 222, and 446. A six meter 5/8th wave unit is also available, (I do not have a price on the six meter antenna at this time).

Full information and pricing for all Bozak antennas can be had by calling Steve Bozak at 518-373-8069 or send a fax to him at 518-373-0701. His address is Steve Bozak, 100 Church Hill, Waterford, NY 12188.

At the same hamfest, I was introduced to the **Hex-Beam**. The Hex-Beam is a hexagonal antenna that performs like a two element yagi. The antenna is built of special PVC, fiberglass, and machined aluminum.

This is one compact lightweight antenna and appears to be very rugged. It is beautifully built and provides an extremely low profile.

The manufacturer claims excellent results with the antenna at low heights and a 6 to 8dB gain.



The Hex-Beam is available as a monobander on 6 to 40 meters, or a multi bander on several different combinations of bands. Prices vary from $89.00 for a six meter model to $849.00 for the 40-17-12 meter multiband unit.

This antenna is also available as a portable unit that fits into a very compact back pack and covers 6 to 20 meters; price of the portable unit is $389.00.

For full info and spec sheets contact the manufacturer at Traffie Technology, 421 Jones Hill Rd, Ashby, Ma 01431-1801. (Note: A complete review of this antenna is planned for the near future).

Last but not least on our wish list is a piece of ham software that I really get a lot of use out of: It is **QRZ**, a callsign data base that includes over 1 million ham listings worldwide, plus 1400 programs for electronics, 113,000 E-mail addresses, and 1700 digital images. FCC exam training, Morse code programs and computer control programs are likewise included on this low-priced CD ROM. Call signs in many countries are included (23 countries currently).

As a call book, you can sort by call sign, name, or zip code. And any of the programs can be run directly from the CD.

Usual street price for QRZ is about $14.00; the CD can be purchased at most ham radio stores or your local hamfest. If you cannot find a local dealer contact Walnut Creek CDROM at 1-800-786-0783.

Until next time, Happy Thanksgiving, one and all.

Jock Elliott, KB2GOM
lightkeeper@sprintmail.com

Radio Shack's Easy FRS Radios

Industry insiders tell me that Radio Shack and Motorola enjoy the biggest shares of the mushrooming Family Radio Service (FRS) market. That isn't surprising: Motorola has certainly the most aggressive marketing campaign for its FRS offerings, and Radio Shack outlets are simply everywhere. It seems that almost every village in America has a Radio Shack store in which you can shop for electronic goodies.

As if to drive home the point, one morning not long ago I was sitting at the computer when a couple of voices broke through on FRS channel 1. It was a husband and wife traveling from Vermont to Colorado in two separate cars and using FRS to stay in touch between vehicles. They were using the Radio Shack 21-1802 single-channel FRS radios, which cost $59.95 each. "It was the cheapest way to get the job done," the husband said.

The single-channel Radio Shack FRS transceiver is the soul of simplicity. It operates on FRS channel 1 (462.5625 MHz), uses four AAA batteries (alkalines provide about 24 hours of life), and has an automatic power save mode that activates when you do not transmit for over 8 seconds. The owner's manual for this radio states that the transmit power is only 100 milliwatts. That's only one-fifth the maximum legal power for FRS radios.

This radio measures about 4-1/4" x 2" x 1-3/16"(less antenna). There is no belt clip, but there is a fastener for a wrist strap. A single knob on the top of the radio turns it on and adjusts the volume. On the left hand side of the case are a push-to-talk button and a button for turning off the auto-squelch. On the back of the case is a removable panel for inserting the batteries.

On the front of the 21-1802, there is a grill for the speaker/microphone and a red light that activates when transmitting or when the batteries need to be replaced. Also on the front, a Call button which, when pressed, causes a paging tone to sound on all FRS radios tuned to channel 1.

Also available from Radio Shack is the 21-1807 14-channel FRS transceiver which costs $119.99. This radio measures 2-1/5"W x 3-7/8"H (excluding antenna) x 1-1/8"D (excluding belt clip). The 21-1807 offers 38 CTCSS (Continuous Tone Coded Squelch System) tones (Radio Shack calls them Quiet Codes), a call button, 30-hours nominal battery life from two AA alkaline batteries, 150 milliwatt output power, a backlit display, a connection for an optional speaker/microphone or earphone, and last channel memory.

On the front of this FRS radio are the display, two buttons for changing channels, and a Quiet button that allows CTCSS tones to be selected and activated. Any tone, once selected and activated, applies to all 14 channels. Radio Shack neatly gets around this by allowing the Quiet function to be turned off for all channels with a single push of the button.

Curiously, the owner's manual says: "We recommend that you select a quiet code from the range 7-30. If you select a code below or above that range, you must wait 1 to 2 seconds after holding down Push-To-Talk before you start talking." Radio Shack tells the reason is that the CTCSS tones are implemented in the micropressor, and it takes longer for the processor to lock onto those upper and lower codes.

You can lock all but the transmit functions of this radio by pressing the CALL and MON buttons at the same time. A small key icon appears in the display. In addition, a shut-off timer automatically turns off the radio if it is idle for two hours. This feature can be turned on or off by pressing the Channel down button while turning the radio on.

In the field, these two radios offer virtually identical performance. Both offer crisp, clear audio, provided you keep at least a hand's breadth between the speaker/microphone grill and your mouth (otherwise your voice may sound muffled or distorted). As might be expected, range of these radios was less than other FRS transceivers that offer a full half-watt of transmit power. Still, both offered approximately the same range as the Kenwood FRS radio, which had 330 milliwatts of transmit power.

The bottom line: if you want the ultimate in range from your FRS radios, you'll probably want to look elsewhere. But if you plan usage over shorter ranges (say, up to a mile), either of these Radio Shack offerings works well, and the Call button is a neat feature that makes them especially easy to use.

ASK BOB
ANSWERS TO YOUR RADIO QUESTIONS

Bob Grove, W8JHD
bgrove@grove.net

More on those Patrolman Portables

In our August issue, we referred to the fine line of portable multiband radios offered by Radio Shack a number of years ago. Reader Doug Robertson reached back in time for a little more information.

The unit in question, the Patrolman SW-60, was first listed in the 1984 Radio Shack catalog and continued through 1990, priced regularly at $99.95 and on sale for $69.95. Previous models included the Patrolman CB-6 (my favorite) and its follow-on, the CB-60, which inaugurated the 1980s.

Thanks, Doug, for the nostalgic visit.

More on Lightning

In our September column, we discussed the paths of lightning. Ray Hodgkiss, a faculty member of the Department of Computer Science, Indiana University, Bloomington, has much more to offer. Let's listen to some of his comments:

"You are correct in assuming that about 20% of all lightning flashes are cloud-to-ground. (Kessler, *Thunderstorm Morphology and Dynamics*, University of Oklahoma Press, copyright 1986, page 283.) However, one type of cloud-to-ground lightning does occur more frequently than another. The first type of CG "usually deposits a negative charge." (Kessler, 291) The other type, +CG, "deposits a positive charge." (Kessler, 291).

"While I was working on my MS in Meteorology, we had a lightning detector that allowed us to observe the "strength" of CGs (in amps) and also whether they were "positive strokes" (+CGs). I noticed that less than 25% of all CGs were positive strokes. (It may be as low as 10%)

"Positive strokes tend to be MUCH more powerful and longer in duration (so that) one can observe a positive stroke in the field, because the strokes last MUCH longer than most other ones, which appear nearly instantaneous."

Fascinating, Ray, and thanks for sharing this information with our readers.

***Q.** Would you benefit from better lightning protection by putting two or more surge protectors in series? Does switching off a power strip achieve the same protection as pulling the plug in a lightning storm? (Vincent Murphy, Albany, NY)*

A. No to both questions. If you put two or more surge protectors in series (actually parallel because the gas discharge tubes will all be across the line, not in series with it), the first one to conduct will do all the work. And while switching off the power strip and pulling the plug both prevent AC from reaching the equipment, a direct strike is more likely to jump across the open contacts of a switch than from the wall to a disconnected plug.

***Q.** Will a better shortwave radio allow me to hear more shortwave signals, and should I listen in the daytime or evening? (William Waros, N. Vandergrift, PA)*

A. You may not hear more signals, but you will hear them better. A quality communications receiver helps separate closely-crowded signals so they cause less interference to each other.

A general rule of thumb is that you should listen below 10 MHz at night, and above it during the daytime. There is some crossover in that range, but lower frequency signals are best heard at night, with the higher best heard during daylight hours.

Bob's Tip of the Month

The "Power Tip" Scam

Many readers have brought to our attention ads circulated by mail order companies for the "Power Tip," also called the "Super Signal Booster," an inverted-teardrop-shaped plastic contrivance advertised to "improve reception on your radio or cordless phone instantly." The ad usually continues, "Originally developed by military communications experts for Operation Desert Storm."

Super Signal Booster's imaginative ad writers tell us that it doesn't even have to be connected to the affected radio: "If the antenna is of the thick, rubberized sort, place the Super Signal Booster on a nearby antenna. For example ... (w)hen using your cellular phone in the car, place the Super Signal Booster on the car's outside radio antenna." (!)

The facts, however, are much different from the deceptive hype. The plastic glob is actually an eye protector, designed to reduce the risk associated with walking around military vehicles equipped with whip antennas. The bubble is absolutely hollow except for a small, toothed washer which grips after the unit is slipped over the top of the whip.

MT readers James Peters of Scottsdale, AZ, and Michael Tammaro of Cranbury, NJ, discovered that theirs didn't seem to do anything at all. Undaunted, and with tongue in cheek, Michael suggested several possible uses for the quack device:

(1) Place it on your car antenna so you can find it easier in a crowded parking lot;

(2) Sew it into your pajama shirt to prevent you from snoring;

(3) Tell young children it is a cyborg's eyeball—and it's watching them;

(4) Set it on your coffee table to tempt friends to ask, "What the heck is that?"

Now, after we dismiss the Power Tip, we may begin working on the "Crystaldyne" and its kin (electric barbecue ignitors being sold as acupuncture therapy) and the "Mineral Magnet" (small magnets to be attached to a water pipe to "modify the polarization of mineral salts" in your drinking water).

Perhaps, in an age where technology surges ahead of understanding, a zealous marketing agent may be excused for taking the word of the original vendors of these fraudulent devices, so write to the catalog companies and inform them of the facts. If they remove the ads from their catalog, fine; if not, turn them in to the Consumer Protection or Consumer Affairs office of your state Attorney General.

NEW

WiNRADiO®

From the Pioneers of Computer Controlled Radio now comes a whole new range.

Internal Model (WR-1500i)

The popular WiNRADiO WR1000i is the world's first commercially available PC-controlled scanning receiver. No wonder it has received the coveted Most Innovative Receiver Award for the Year 1998, by WRTH.

However, this fine receiver has now finally encountered serious competition:

Our own.

WiNRADiO Communications now proudly introduce a new series of radio-controlled PC-based receivers, in both internal and external versions:

- WR1000i ... 100% internal 1300MHz scanning receiver
- WR1000e ... 100% external 1300MHz scanning receiver with standard RS-232 control and optional PCMCIA (PC-card) interface
- WR1500i ... 100% internal 1500MHz scanning receiver
- WR1500e ... 100% external 1500MHz scanning receiver with standard RS-232 control and optional PCMCIA (PC-card) interface

External Model (WR-1500e)
(computer not included)

The 1000/1500 series products offer cost-effective solutions for a wide variety of applications. The products come in two forms: internal ISA-bus cards, and compact external units with an RS-232 interface (PCMCIA interface optional).

The WiNRADiO Virtual Control Panel

The advantages of an internal card model are in its neatness – there are no external cables required, no external interface ports are occupied, no external power supplies or extra desk space are needed. And if you wish, nobody needs to know that you have a scanning receiver hidden inside your PC!

Multi-channel operation is simple to achieve, as up to eight WiNRADiO internal receivers can be used simultaneously in one PC.

Spectrum Scope

The advantage of an external model is in its portability – the optional plug-and-play PC card interface (PCMCIA) allows a very fast and simple installation for any portable PC. Serial RS-232 interface is also available as standard.

Both models are very well shielded from PC interference. We use specially developed shielding materials and innovative design methods to prevent any interference directly entering the receiver.

Software options:

- WiNRADiO Digital Suite software for decoding of WEFAX, HF fax, packet, ACARS, DTMF, CTCSS; for signal classification, audio spectrum analysis, squelch-controlled playback and recording.
- WiNRADiO Database Manager

Hardware options (for external models):

- WiNRADiO Portable Power Source for a truly portable computer-controlled radio system, containing nickel-metal-hydride batteries and an intelligent battery charging facility with battery charge indication.
- WiNRADiO PC Card Adaptor allows the use of PCMCIA card interfaces commonly used with laptop computers.

WiNRADiO receivers are available from selected radio dealers in North America.
See our Web site **www.winradio.com** for more details or email enquiries to info@winradio.com.

Lawrence Magne
Editor-in-Chief, Passport to World Band Radio

Germany's Kneisner + Doering KWZ 30

Years ago, when my wife's beloved Volkswagen Beetle was unceremoniously ripped off, it was difficult to find an affordable replacement with decent gas mileage. In the end, I sprung for an inexpensive, old, low-mileage Mercedes that needed its share of mechanical work.

I quickly learned how Mercedes gained its reputation. Even though this model was singularly unglamourous, it was built like a rolling fortress. These days, however, even Mercedes isn't made the way Mercedes was made just a couple of decades ago. Indeed, what is? The premium is on advanced engineering and lower prices, so what has been sacrificed—even in mighty Deutschland—is bulletproof construction.

$1,800 receiver tough as a tank

Well, almost: because a new German manufacturer, Kneisner + Doering, has come up with the KWZ 30, a DM3,005 (roughly US$1,800) DSP tabletop receiver built to panzer-tough professional standards. Its case is made of black-painted stainless steel, while the front panel is fully two-millimeters thick. The operating circuitry uses two DSP chips, rather than the solo chip used by the new Japan Radio NRD-545 we've been reporting on in recent months.

The KWZ 30 is clearly a labor of love, the result of years of effort by a team of German amateur radio operators who are also electrical engineers. Unsurprisingly, it was intended to be the *ne plus ultra* of ham receivers. But as hams now use transceivers almost exclusively, the manufacturer quickly found that the real interest was coming from a market they scarcely realized existed: shortwave listeners and DXers.

Few controls, but clever operating system

The receiver has few discrete controls. Instead, operation is by software command, as with the AOR AR7030. But, unlike the '7030, it is vastly more intuitive to operate, thanks to a larger display, four function keys and better software. While those who prefer a panel full of discrete controls are still not brimming with enthusiasm over the KWZ 30's operating scheme, it is nonetheless the first such receiver that gets their nod of approval. The English operating manual helps and is well written. But even without a manual, operation can be figured out over time—although more function keys would certainly help.

The receiver tunes and displays in one Hertz increments from 6 kHz through 30 MHz, with reduced sensitivity below 50 kHz. Its large backlit LCD is highly visible at various angles and different ambient lighting conditions. The large, flywheel-effect tuning knob has superior "feel" and grip, with lots of tuning-speed choices. The all-important and hopefully robust keys are plastic tabs that click decisively when pushed, like an IBM keyboard.

Power is from an outboard "wall wart" AC adaptor instead of a multivoltage inboard power supply. The manufacturer doesn't as yet offer a 120 Vac adaptor, but Ohio's Universal Radio is considering importing the receiver for distribution and sale within North America. If it does, it would of course provide a suitable adaptor.

Those who choose to act as their own importers can use the $40 Radio Shack #22-504 power supply, which works properly but runs hot. Its banana plugs won't fit into the receiver's input socket, so a short length of cable or wire and some basic soldering, as well as attention to polarity, are needed to make this work.

The KWZ 30 has no clock, but it does have an automatic notch filter which doesn't perform as well as it could. There is also passband shift, although it is of limited use because it doesn't function in the AM mode. The DSP—digital signal processing—system is also used for noise reduction; when carefully adjusted, it can be helpful in increasing intelligibility. The 250 presets store many useful parameters, although not alphanumeric station names.

Novel detector reduces fading distortion

There is no synchronous selectable sideband, but there is an ingenious type of AM detection in which the decoder samples both sidebands to calculate precisely the envelope curve of the audio. The theory is that the detector shouldn't need a carrier, and thus the receiver should be immune to selective fading distortion; *i.e.*, when a fade selectively attenuates the carrier more than the sidebands.

This novel detection system assumes both sidebands are at an equal level. Unfortunately, with shortwave and other skywave signals, most fades pass through the signal bit by bit, first attenuating one sideband, then the carrier, and ultimately the second sideband. This means that in practice the two sidebands are often at unequal levels, so the detector performs less well than true synchronous detection. Nevertheless, it comes across better than conventional diode detection.

Astonishing AGC improves DX and audio

On most tabletop models, there are two or three automatic gain control (AGC) decay rates. On the new NRD-545 DSP receiver, one of our strongest criticisms is that there is only one AGC setting for the AM mode. However, on the KWZ 30 the AGC time constants can be controlled to an astonishing degree in all modes.

Here's how it works. As you would expect, the decay rate can be varied, just like on most other tabletop models, but with the KWZ 30, that's just the beginning. The attack and hang times, along with digital gain, can also be regulated individually—*four* operator-adjustable variables in all! Think about when you have heard about something like this before, and the answer is simple: you haven't. It is nothing short of incredible.

This is no gewgaw. Serious DXers will find these precision adjustments to be well worth taking the time to master to enhance the intelligibility of extreme DX signals. Too, because the KWZ 30 is a DSP receiver, precise AGC timing can make an audible difference in reducing the slightly artificial sound characteristic of any DSP gear.

If the AGC controls are set properly and you use a good outboard speaker, the resulting audio quality is powerful, pleasant and highly intelligible. This is despite a pedestrian level of overall distortion, which we measured at various audio frequencies as being from three to ten percent.

Professional receivers, at least those intended for the United States government, are invariably equipped with a 455 kHz IF output. For now, at any rate, the KWZ 30 has no IF output and one can't be retrofitted, so it can't use a Sherwood SE-3 outboard synchronous detector. Presumably this will be an option someday, if only because at least one official American agency has already indicated it wishes to place a quantity order if the receiver can be fitted with an IF output.

Laboratory test results run the gamut

As usual, we do our own laboratory testing, which we have tailored over the years to reflect the specific needs of shortwave listening and DXing. With the KWZ 30 this turned out to be especially illuminating, as some of the manufacturer's published measurements of performance turned out to be far grander than what we found.

For example, phase noise and the impact of blocking makes measurement of ultimate rejection dubious below 50 dB on the KWZ 30. Ditto the shape factors, which require a minimum of 60 dB ultimate rejection for measurement. Our adjusted measurement norm to allow shape factors to be measured (sort of) for the nine available voice bandwidths show a range from 1:1.3 to 1:1.8. These are superb numbers, but we know that in reality they are even better than this—we just can't measure more precisely because of the receiver's phase noise and blocking characteristics.

At 20 kHz signal separation points, dynamic range is superb, 100 dB, as is the third-order intercept point, +20 dBm. But because world band broadcast channels are 5 kHz, not 20 kHz, apart, we also measure using 5 kHz separation points. Here, dynamic range nosedives to a dismal 60 dB, and third order to -40 dBm—a shortcoming we rarely find in modern receivers. This is especially surprising, inasmuch as the KWZ 30 was designed originally to be a ham receiver. Ham bands, especially under CW contest conditions, can be far more congested with meter-bending signals than the shortwave broadcasting bands (of course, on 40 meters in the Americas you get both).

Our other lab measurements range from good to superb, and you can hear it with your ears. For one thing, the KWZ 30 is audibly very quiet, and while we didn't get to test it on a winter DXpedition this could well be an exceptional rig for hearing super-weak signals in areas free from local electrical noise.

Impressive listening results

Program listening, world band DXing and utility DXing also fared well during our listening tests. Even the digital signal-strength indicator turns out to be not only highly readable, but also has unsurpassed accuracy—a plus for station monitors and field engineers. (However, since our tests were completed, I received a letter from reader John Wagner of Ohio about a local AM-band signal on 1460 kHz popping up around 18.1 MHz on the KWZ 30.)

The Kneisner + Doering KWZ 30 is an eyebrow-raiser. Its build quality is the stuff of legend, and audio is surprisingly good by any yardstick, but especially for a DSP receiver. Yet, there are kinks, like poor close-in dynamic range and ultimate rejection that is sharply limited by phase noise and blocking. It is not yet the coin of the realm.

Apparently only two hundred KWZ 30s have been manufactured to date. During and after our tests, we were in considerable contact with the manufacturer, which has been unusually receptive to critical observations and suggestions from us and others. Clearly, there is no shortage of expertise or will at the German headquarters to improve upon the KWZ 30 in due course. Whether the requisite manpower and capital exists for a redesign anytime soon of a receiver which has only just barely gotten off the ground could well be another matter.

But even as is, the KWZ 30 is a tank tough, serious machine priced well under any other receiver with this level of build quality.

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This equipment review is performed independently by Lawrence Magne and his colleagues in accordance with the policies and procedures of International Broadcasting Services, Ltd. It is completely independent of the policies and procedures of Grove Enterprises, Inc., its advertisers and affiliated organizations.

Bob Parnass, AJ9S

Alinco DJ-X10T Scanner

The Alinco DJ-X10T is a handheld, wide coverage receiver made in Japan for the US market by a company already known for its ham radio equipment.

Multimode frequency coverage extends from 0.1 to 2000 MHz (minus cellular bands) in 20 selectable step sizes from 0.05 to 500 kHz. A knob atop the radio clicks when rotated and serves as a variable frequency oscillator (VFO) knob, channel selector, and menu navigation control.

Our DJ-10XT came furnished with an EBP-37N 4.8 V, 700 mA/h NiCd pack and a sturdy, 11-hour drop-in charging stand. Interesting options include a soft carrying case, an EDC-36 automobile DC power cord, an EPB-34N 1200 mA/h battery pack, and an EDC-59 quick charger. The manual mentions a "dry cell case" but cites no model number.

The DJ-X10T can be cloned to another DJ-X10T or connected to a personal computer, but we do not have the cable or software to test. A "light" version of the software may be downloaded from **http://www.alinco.com**.

Like the AOR AR8200, the DJ-X10T is loaded with firmware features and is complicated to use. The DJ-X10T instruction manual isn't as helpful as the AR8200 manual and seems choppy. For instance, the purpose of the Programmed Scan Range mode (PMS) is explained on page 26, but the PMS keystrokes are presented starting on page 42. The manual shows a computer/clone jack but provides no explanation of computer control and doesn't list a computer cable as an option.

Memory

The DJ-X10T supports two variable frequency oscillators (VFOs) and 1200 channels in 30 banks of 40 channels each. Memory banks are cryptically designated A0-A9, B0-B9, and C0-C9. The DJ-X10T would be easier to use if it simply had 26 banks, labeled A-Z.

Each memory channel can be programmed with the frequency, an eight-character label, attenuator, a skip (lockout) flag, and mode (WFM, NFM, AM, USB, LSB, CW, AUTO).

Scanning and Searching

Comparison with the ICOM IC-R10 is inevitable. Unlike the IC-R10, the DJ-X10T can scan more than one bank at a time. Both models scan slowly through an assortment of VHF/UHF frequencies at only 6 channels per second (see comparison chart). The DJ-X10T rescan delay is about 1 second and we cannot disable or lengthen it.

The Auto Memory Write facility permits you to search between upper and lower frequency limits and store active frequencies only in bank C9. Only 40 frequencies may be stored, and the DJ-X10T stores the same active frequencies over and over rather than checking for duplication.

There are 20 search banks, designated P0-P9 and p0-p9, which you can program with frequency limits and labels. Search banks can be linked together, permitting you to search disjointed parts of the spectrum, e.g., 146 - 148 MHz and 440 - 445 MHz. You can also search between the frequencies in both VFOs. Up to 50 frequencies per search bank can be locked out using the Pass facility.

A priority feature lets you designate one channel to be checked for activity every 5 seconds while scanning memory channels or searching. The periodic sampling interrupts activity on an active frequency, accompanied by a noticeable noise burst.

Other Features

The DJ-X10T contains other features which set it apart from simpler scanners:

1. a digital clock with on/off timer
2. a battery saver circuit which can be disabled
3. the ability to scan or search for signals above a selectable threshold
4. the ability to search only channels with a specific mode
5. the ability to clear the contents of all memory channels in a bank
6. a band scope which graphically portrays activity within a band of frequencies 7 or 40 steps wide

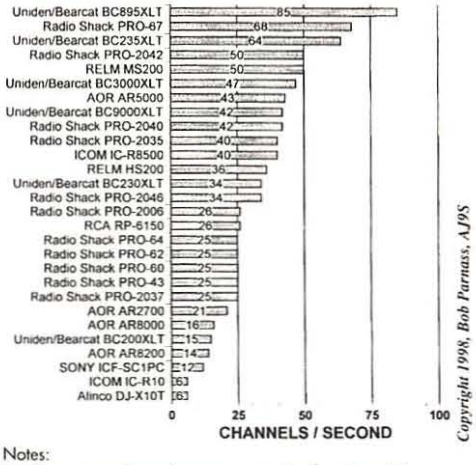
Rugged Construction

This is one of the most ruggedly built scanners since the old Regency HX-1500. With its metal back and snap-on battery pack,

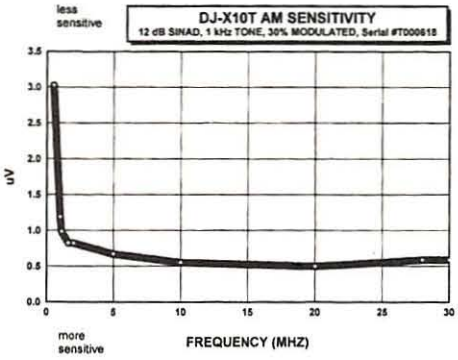
MEASUREMENTS
DJ-X10T PORTABLE SCANNER
S/N T000618

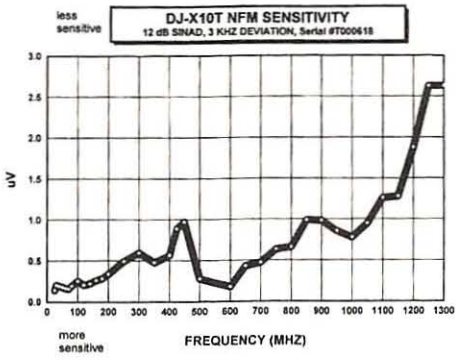
Frequency coverage (MHz):
0.1 - 1999.9999 MHz,
except 824 - 850 and 869 - 895 MHz
Step sizes (kHz):
0.05, 0.1, 1, 2, 5, 6.25, 9, 10, 12.5, 15, 20, 25, 30, 50, 100, 125, 150, 200, 250, 500
Modes: AM, WFM, NFM, USB, LSB, CW
Sensitivity: see graphs
MDS (minimum discernible signal):
0.18 µV @ 15 MHz, AM mode
FM modulation acceptance: 8.9 kHz
Audio output (measured at earphone jack):
125 mW @ 7% distortion
151 mW @ 15% distortion
Practical memory scan speed:
6 channels/sec.
Search speed: 22 steps/sec.
Current consumption at 4.8 VDC:
off - 0.45 mA
manual - 132 mA
scan - 139 mA
full volume - 195 mA
lamp - 66 mA additional
Battery saver: after 2 sec. Manual mode
Low battery warning at 4.38 VDC or less
Shutdown at 4.04 VDC or less

PRACTICAL MEMORY SCAN SPEED



Notes:
1. Measurements made on one sample of each model.
2. Measured with memories programmed with unsorted frequencies in various bands and AM and NFM detection modes.
3. Measurements are approximate.





the DJ-X10T looks and feels like a 2 meter walkie talkie. The supplied metal belt clip that holds this hefty radio on your belt is fastened to the back with two machine screws.

The single, multifunction knob is conical and difficult to grasp without your fingers slipping off. The control uses a 1/4-inch fluted shaft so you can easily replace the knob. Squelch and volume are set by a pair of momentary contact rocker switches instead of simpler knobs, and we find this unhandy as well as time consuming.

The Function, Search, Monitor, and Lamp keys are mounted under a black rubber boot on the side of the radio. The labels are not painted, making them difficult to read. The remaining keys are well labeled and widely spaced.

Keypresses are confirmed by a beep tone which can be disabled. The dot matrix LCD screen features adjustable contrast via a keypad sequence, though it's not quite as clear as the AR8200 display. The display contains a 7 bar S-meter and a separate green LED lights when a the squelch is open — a nice touch. Both the display and numeric keypad are backlit in green when the Lamp key is pressed. The lamps can be latched on by pressing a two key combination.

VHF/UHF Performance

The stock antenna supplied with our DJ-X10T looks like a 146/440 MHz base loaded rubber whip. Our ICOM FA-1443B dual band rubber antenna provides better VHF-high and UHF reception.

In short, 30 - 1000 MHz sensitivity is good, and we heard few birdies and little intermod. WFM broadcast reception is head and shoulders above the table radio inside our steel and concrete office.

The DJ-X10T squelch can be set to one of 10 levels, labeled SQ0 - SQ9. SQ0 disables the squelch so white noise is heard in between transmissions. We keep the squelch set to SQ3 or higher, otherwise it opens at inappropriate times, especially when the battery saver is active.

The DJ-X10T instruction manual does not specify the IF (intermediate frequency) scheme, and this information is omitted from the AR8200 manual as well. Filters inside the DJ-X10T imply 0.455, 10.7, and 45 MHz IFs. Our tests indicate a first IF of 736.25 or 275.45 MHz, depending on the frequency to which the DJ-X10T is tuned. Our DJ-X10T hears images of cellular phone signals clearly in the 1419.9 - 1444.9 MHz range, 550.9 MHz above their actual frequency. We measured a sensitivity of 0.41 - 0.56 µV (12 dB SINAD) to these cell images.

Shortwave Reception

None of the handheld wide spectrum scanners we've tested provides good shortwave reception with the supplied antenna, and their tiny knobs make band surfing difficult. The older, larger shortwave portables, like the Sony 2010 and Magnavox D2935, run circles around them.

Our DJ-X10T hears better on shortwave than the AOR AR8200 we tested. Passable shortwave reception requires the DJ-X10T be used with a longer antenna, but not too long. A 132 foot dipole overloads our DJ-X10T, necessitating use of the built-in attenuator.

Overall

With a street price under $400, the Alinco DJ-X10T is ruggedly built and sized just right. It can be powered by a variety of battery packs, in probably the best arrangement of any scanner. We like the solid VHF/UHF performance, wide frequency coverage, and memory bank flexibility.

Like the IC-R10 we tested, our DJ-X10T's main drawback is that it scans too slowly. The bank naming convention is obscure and complicates programming. The Auto Memory Write operation should not store duplicate frequencies, and the user should be able to assign a 2 to 3 second rescan delay on a per-channel basis.

John Catalano, PhD
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DC-to-Light Communications

When you hear the word "wireless," what do you think of? Most of us would probably answer, "radio waves." However, in today's developing personal computer market, another wireless technology is being developed for short distance data communications: IrDA is the acronym and light is the media.

But first, let me give you some of my impressions after using WinRadio's new, dc-to-light, external computer receiver — the WR1500e — for a few weeks.

Last time, we loaded the WR1500e software and hooked up the "box" to a laptop. Since then, we have tried both the serial connection and the PCMCIA card radio/computer connection. The latter appeared to be faster. But in either case the procedure could not have been simpler or easier. As we saw last time, the software for the WR1000 and the WR15000 appear to be exactly the same. The only difference is the allowable frequencies which the user can enter. The WR1000 stops at 1.3 GHz, while the 1500e goes up to 1.5 GHz. On the low end, the WR1000 stops at 0.5 MHz and the WR1500e goes down to 0.15 MHz, covering the aero/marine beacons and longwave broadcast stations.

The installation program had us up and running in a matter of minutes. We started our monitoring in the shortwave band around 6 MHz. The WR1500e comes with a wire antenna that has shielded cable on the first few feet, close to the receiver/computer. This is an attempt to minimize computer noise. However, as we have previously suggested, and is reiterated by WinRadio in their "Read Me Please" enclosure, a tuned antenna or preselector is advised for more than casual monitoring when using any wide-band receiver.

Not heeding our own advice, I just gave a quick tune to the 6 MHz shortwave broadcast band using the wire antenna. On this September evening you can see from Figure 1, the Spectrum Scope, that the band was quite crowded. Yet we were able to clearly listen to seven stations. Five other stations were about 80% in the clear. An additional five stations varied from listenable to impossible. Not bad for crowded, high powered, broadcast listening. But what about my first monitoring love, utilities? Using an *MT* column, we (my wife reading and me typing) entered a batch of USAF HF frequencies.

Since the WR1500e has separate USB and LSB modes, tuning utility and ham stations is easy. As we used the channel scan feature, 6.739 MHz came alive. Then 15.016 MHz went active. Again, not bad. But now, I wanted to use the WR1500e where I believed it would outshine all competitors: VHF, UHF and SHF.

FIGURE 1. *WR1500e Spectrum Scope - 6 MHz band in Sept*

Up, Up and Away

Even on the wire antenna, I was able to monitor lots of unicomms at small uncontrolled airports up to 60 miles away. Using WiNRADiO's excellent Digital Suite Software, ACARS messages were non-stop the next morning. The WR1500e made scanning the civil aircraft band a thrill once again. Digital Suite is a WiNRADiO program, sold separately, which really provides excellent scanning and decoding features (See May '98 Computers & Radio column for a more detailed discussion of Digital Suite.)

The WR1500e specs say that the receiver has better than a 25% increase in sensitivity over the WR1000 in the 30 to 1000 MHz range using the FM narrow mode; and you can really hear it!

With a whip antenna replacing the wire, I tuned to the 150 MHz service band. The WR1500e did not disappoint me as it pulled in paging stations from over 70 miles away and police, fire and medical services from up to 60 miles away. The Digital Suite's Packet Decoder worked well on a pair of two meter (144 MHz) packet stations about 50+ miles, as the crow flies, from my shack. Ham repeater stations were heard all over the band.

It Gets Even Better

I usually look with envy on reports of military UHF airband (200 to 400 MHz) intercepts. A few years ago, while living near Cape Kennedy, I had no shortage of milair traffic. But from my current location, I usually cannot hear any military aircraft. That is, until I tuned the WR1500e to a list of UHF: mid air refueling, flight service stations and tower/approach mil frequencies at civil airports. I don't know whether it was luck, propagation, timing or just a very hot radio. But the WR1500e crackled with milair activity all day. In a side-by-side comparison, the WR1500e proved to be more sensitive than my PRO-2006 on the UHF mil frequencies.

Up at 451 MHz lives our department of public works (DPW) and small local business communications. When the weather is bad, this is the place to be, as the DPW moves into action. The WR1500e pulled in DPW stations from 40 miles away, about twice the performance of my scanner. Lots of taxis, plumbers, building contractors and heating companies were heard from up to 60 miles away. Using the Digital Suite's Signal Classifier Module made scanning much more reliable, minimizing the annoying false stops that occur on most scanners.

Enough already

By now you must know that I think the WR1500e, together with the Digital Suite, make a useful shortwave receiver and a very powerful VHF/UHF receiver; perhaps one of the best I have ever used. However, no Catalano column would be complete without a "changes I'd like to see" section.

One change I'd like to see is that the audio output power be increased. It's fine for most listening. But at 200 milliwatts it's not much more powerful than a transistor radio, and can be a problem in a high ambient noise environment. One simple solution is to use a powered speaker. Grove sells a number of powered speaker products that would be good candidates.

The WR1500e's scanning speed is maxed out at 50 channels per second. It's not bad. It's not the fastest thing on the scanner block. But overall, the WR1500e, as a VHF/UHF/SHF receiver, rated an excellent in my book.

The computer and monitor you use affect the amount of digital noise. But using the WR1500e with a Fujitsu 735 DX Lifebook resulted in a pretty "quiet" monitoring setup. At $549.95 the WR1500e is a real value. The WR1500e is available from selected dealers. In the USA, you can check Grove for latest

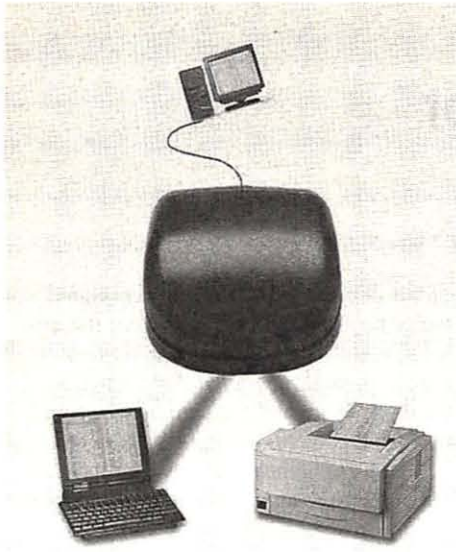


FIGURE 2. *AirData Mouse - The only desk mouse with a light communications transceiver inside*

pricing and availability. Check out the WinRadio website at **www.winradio.com** for dealers, software upgrades and more.

The Other Wireless

If you own a laptop, palmtop, hand PC (perish the thought) or a personal data assistant (PDA) such as the PalmPilot, take a look around the case. Did you find a dark (red/black) window? If so, you already have 50% of a wireless data communications network. No, not wireless like in radio. Wireless, like in light beam communications. This dark red lens may be your entry to the future of personal wireless data communications.

Welcome to the IrDA port. IrDA, Infrared Data Association, is a group of 120+ major computer companies who have formed a consortium and produced a wireless data transmission standard using infrared beams. The first standard, IrDA version 1.0, has a range of 3 meters and a data rate of up to 117 kbs. The whole concept is very user friendly and has been around for a number of years. Even my vintage 1995 IBM 701C ThinkPad has an IrDA port. IrDA makes sharing files between your portable computer and your desktop computer/scanner/printer system simple, easy and convenient.

What! No Desktop IrDA Port?

You say your desktop does not have an IrDA port? Neither do over 90% of all the desktops made to date. Well, now that's no problem. A company in Vermont, Selectech Ltd., makes a fully functional desk mouse, AirData Mouse, for use with any computer with a serial port and running Windows 95 or 98. See Figure 2.

Inside the AirData Mouse is a complete IrDA transceiver. Selectech patented the "IrDA in a mouse concept" in 1997. So now any Win 95/98 PC (laptop or desktop) can transmit and receive infrared data from any IrDA device; even another AirData Mouse. For example, the AirData Mouse provides wireless connections to IrDA capable laptops from IBM, Compaq, Fujitsu and lots of other laptop manufacturers. Existing IrDA products include: Canon's BJC-80 color printer, HP's IrDA printers, IBM laptops, IrDA compatible electronic cameras and lots of soon-to-be released IrDA peripherals. Even Hand PCs like the Cassiopeia have a built-in IrDA Port.

To use AirData Mouse I went to the IrDA icon on the Control Panel. Clicking the "new driver" menu, I loaded the included AirData Mouse driver disk. Next, you'll be prompted to re-boot your machine. Choose the "Shut Down" option, if you are given a choice. After you shut your computer off, disconnect your existing desk mouse. Then install your AirData Mouse in your serial port and connect it into your keyboard port for power. No external "wall wart" is needed. When you turn your computer on, Windows will identify the AirData mouse as a "new device."

Broadcasting Data

Now double click the IrDA shortcut which appears on your desktop. Click "Enable" and the transceiver will be activated. If another IrDA device is in range, the two will automatically make a wireless connection and tell you who is "talking" to you. If the "link" is broken, your computer will continue searching for another IrDA transmission.

AirData Mouse, including all cables and adapters, is $49.95 and is available from Selectech at (802) 878-9600. See their web site at **www.selectechltd.com**. Mentioning John from *MT*'s Computer and Radio column will get you free ground shipping. This offer is good for up to 30 days after this issue hits the newsstands.

Windows CE Feedback

Wow! I think I stirred up a hornet's nest with this one. I felt I was duped by the name and the marketing hype, since WinCE is not compatible with Win 3.1, 95, NT or 98. However, half of the Emails and letters I received held a very positive opinion of Windows CE. The rest of the readers think I hit the nail on the head.

The computer retailers I've spoken with at a recent trade show expect Windows CE Hand PC to be the "real big" sellers of the 1998 Christmas Season.

Windows was not the first, nor is it the only graphical user interface (GUI). The old Atari ST system and the MAC used GUIs. So why did Microsoft see fit to name all their GUIs "Windows"? If they were all downward compatible, as 3.1, 95 and 98 are, then there may have been a logical reason. But if CE is not at all compatible, why use a misleading name? Time will be the judge. I did see a shareware website with a Windows CE section. If it's of any use we'll take a quick look at it. Till next time.

Kiwa Earth Monitor

By Kevin Carey

Although Kiwa Electronics is best known for their line of receiving accessories, the addition of the Earth Monitor™ now puts a receiving device in their product lineup. The Earth Monitor is capable of tuning into the fascinating realm of "natural radio" — the study of signals from planet Earth. These signals include "sferics," "tweeks," "whistlers," "dawn chorus," and other phenomena occurring in the Extremely Low Frequency (ELF) and Very Low Frequency (VLF) radio spectrum. The unit detects a broad band of signals from 10 Hz to 15 kHz.

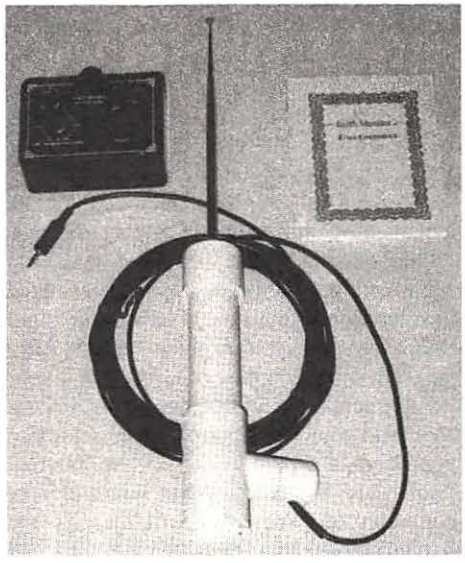
Not too many years ago, the only practical way to hear natural radio was to build your own detector, or adapt some other piece of equipment such as an audio amplifier or selective voltmeter. Even today, there are few commercial units available, so it's refreshing to see a new entry to the field from a respected firm. It confirms my belief that we are entering the "golden age" of natural radio.

Product Overview

The Earth Monitor is a compact, portable unit measuring 3" (76 mm) x 4.5" (114 mm) x 2.25" (57 mm). It is designed to run from six internal AAA batteries or from an external source of 6 to 15 Vdc. The unit draws only 22 milliamperes, so battery life should not be a major concern. For long trips, however, the external power feature allows operation of the set from a car battery or other high capacity source.

The Earth Monitor shipment includes the detector itself, antenna (more on this later), and an instruction manual. All you need to supply are batteries (or external power) and a pair of headphones. Kiwa recommends using 30 to 600 ohm headphones such as those included with personal stereos.

The rear panel of the device includes connections for signal input, headphones, external power, and record output. I especially like the provision for recording; it provides an easy way to capture those moments when natural radio signals are at their best. The record output is at a constant level and does not vary with the setting of the unit's volume control.



The Kiwa Earth Monitor includes everything you need to get started in the world of natural radio. (Antenna pictured was first design as tested by this author.)

Reception

It is well known that you should be far away from power lines and electrical equipment when you listen for natural radio signals; if you're not, 60 Hz hum can wipe out all but the strongest signals. Despite this, I decided to begin by testing the receiver in a "worst case" environment—my radio room. To my surprise, some "swooshy" whistlers and pings were heard right away, and the 60 Hz hum was not nearly as bad as I had expected. The credit for this goes to the filters built into the Earth Monitor.

Another surprise came when I was able to hear the weak but distinguishable beeps from the Russian Alpha system on 14 kHz. Although my interest was in hearing natural radio signals, it was reassuring to hear these VLF radio beeps.

Encouraged by these initial tests, I drove a few miles into the country to get away from high voltage power lines. When I reached a point about a half-mile from the nearest line, I turned the set back on and was greeted by plenty of clearly audible whistlers and virtually no hum. A bee flying near the antenna was also clearly heard! Insects generate electrostatic energy as their wings beat through the air, and this can often be heard on ELF receivers.

I had excellent results by just holding the antenna base in my hand, though the manual recommended it be mounted 10 feet above the ground. However, to reduce interference problems Kiwa is now redesigning the entire antenna to incorporate a grounding stake and a 20-foot spool of antenna wire instead of the 33-inch telescoping antenna.

The antenna is just one type of input sensor planned for the signal detector. According to the manual, Kiwa intends to make other types of sensors available, such as a parabolic microphone for listening to birds, and a hydrophone for listening to dolphins and whales. These will certainly add versatility to the unit!

The manual for the Earth Monitor is brief but complete; its shirt pocket size makes it ideal for use in the field. Besides covering the operation of the unit, the manual describes the types of signals you can hear and sets reasonable expectations for listening success. My only complaint is that the type size proved a challenge even for my nearly 20/20 vision.

The Bottom Line

The Kiwa Earth Monitor has a sturdy, substantial feel, and its on-air performance exceeded my expectations. If you've been hearing about natural radio for years, but have never actually tuned in, this unit will bring the signals to life with minimal fuss. At $145 it's priced a bit higher than some other VLF receiving devices, but, in my opinion, this is justified by the quality of the unit and its ease of operation.

For more information contact Kiwa Electronics, 612 South 14th Avenue, Yakima, WA 98902, or visit their web site at **http://kiwa.com**. The Kiwa web site also contains a link to Stephen P. McGreevy's excellent tutorial on natural radio (highly recommended).

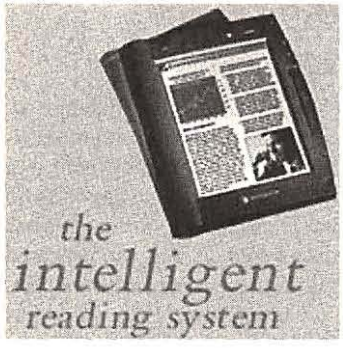
WHAT'S NEW?

TELL THEM YOU SAW IT IN MONITORING TIMES

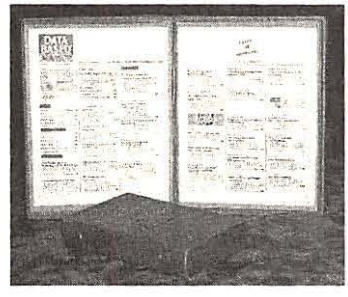
Gearing up for Christmas

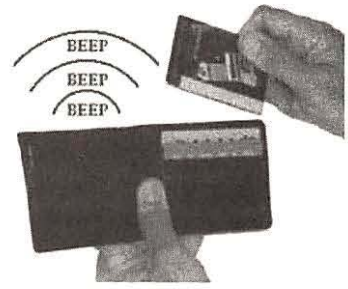
Every year new technology offers up more gadget goodies. Here are a few our readers have sent in.

As computer chips become increasingly sophisticated, they are changing the nature of children's toys. Here are some examples: Lego Mindstorms allows children to build robots that interact with their environment. Interactive dolls are being introduced by a number of companies: computer chips allow the dolls react differently to various ways of squeezing or touching, interact with associated television programs, change what they say or do according to external stimuli, and/or be programmed with specific information about the child. These include Microsoft ActiMates, Amazing Amy by Playmates Toys, My Interactive Pooh by Disney, and Toyriffic's Takin' Care of Baby.



How about electronic books? Three approaches are making their debut this fall or early next year. You can read more about them at the following web sites: NuvoMedia's Rocket eBook **www.nuvomedia.com**; Softbook by Softbook Press, **www.softbook.com**; Everybook's EB Dedicated Reader, **www.everybk.com**.





You'd better use tact if you put the Body Logic (available at K-Mart) by Omron Healthcare under the tree. Hold onto the handles for seven seconds and an undetectable electric current will read out the user's body-fat, accurate to tenths of a percent.

In addition to the dangers of plastic melt-down, the likelihood of credit card loss or theft increases during holiday shopping.

Now you can be alerted any time your credit card is out of its usual slot with the "Beeping Wallet," **www.beepingwallet.com/** Once the card is removed, the wallet will beep every 20 seconds until it is restored — or until five minutes have passed.

The Wireless Weather Station

Davis Instruments, famous for its quality weather instruments, just made installation much simpler. Now you can mount your instruments in their weather-tight shelter atop a roof or mast with no wires or cables necessary. Their data is transmitted in the 900 MHz band to be received by the display module as much as 400 feet away.

Each station comes preassembled and includes premounted sensors, radiation shield, transmitter, and AC adapter for the remote station; plus a display module with its AC adapter. A lithium battery is provided for the sensor if there is no AC outlet, or a solar package is also available.

If you already own a Davis weather station, three new wireless options will allow remote access to its data — Spread-Spectrum Radio Modem, UHF Radio Modem, and Cellular Telephone Modem. These radio modems support a number of transmission ranges and can be operated point-to-point or point-to-multipoint. Solar power options are also available for locations without an external power source. Your choice of radio option will also need to be paired with an antenna installation kit.

Pricing varies widely depending upon the system you design for yourself, so for more information and a free catalog, call 1-800-678-3669 or visit **www.davisnet.com**

Big Features in a Compact Package

The new Icom IC-746 general coverage transceiver is guaranteed to please almost any ham. The tidy, nearly 1-foot square package, provides all-mode communications on amateur HF (1.8-28 MHz), 6 meter (50 MHz), and 2 meter (144 MHz) bands — all at 100 watts output — plus reception of 30 kHz to 60 MHz and 108-174 MHz.

Digital signal processing (DSP) provides noise reduction, automatic notch filter, and three selectable passband widths (80 Hz, 160 Hz, and 320 Hz) to fight interference and augment the audio signal.

The digital display provides a band scope to monitor radio activity, along with signal strength indicator and other easy-to-read informational displays. Three antenna inputs are provided.

The IC-746 suggested retail price is $2,228. For more information, see your Icom dealer or visit **www.icomamerica.com**.

Are you into Leather?

The little mini-handheld receivers and transceivers are amazingly convenient, but there is a built-in liability — as anyone who has leaned over to tie his shoe has discovered as his sophisticated radio slips out of his shirt pocket.

Cutting Edge Enterprises has an equally classy solution — the

Radio Glove. Made of glove-quality leather with punched speaker holes, these pouches are custom designed for the Yaesu VX-1R, Icom IC-Q7, Standard C508A, C108A, and Alinco DJ-C1T, DJ-C4T, and DJ-C5T. The belt clip is also covered in leather and the pouch closes with heavy-duty Velcro. A lanyard is also provided.

The Radio Glove provides protection for the radio in case it is dropped, but why not prevent the drop in the first place? The Radio Pocket PROtector, also made of fine leather, fits into the breast shirt pocket, holds the radio upright and keeps it from falling out, and even has room for a pen and a spare antenna.

Both pouches retail for less than $20. Call 800-206-0115 or 408-429-5384 for a distributor near you, or write Cutting Edge Enterprises, 1803 Mission St., Suite 546, Santa Cruz, 95060. (Although we verified a reported problem with the 800 number last July, it was apparently temporary.)

Stray Signal Detector

Speaking of miniature, here's one for the Christmas stocking! Grove has a tiny new signal detector which measures a scant 1-1/2 inch by 2 inches. The MicroAlert, manufactured by TriField, beeps in the presence of radio signals from 100 kHz to at least 3000 MHz, revealing the presence of concealed transmitting devices, stray radio fields from equipment such as computer terminals, nearby radio transmissions, and much more.

The beeps become more frequent according to signal strength, becoming continuous if the strength is twenty times the selected threshold level. A switch selects between a standard or high sensitivity level, though further adjustment is possible with a set screw. Using the standard threshold, the unit beeps at about 100 feet of a cellular tower, or at 300 feet when set on high.

The MicroAlert uses a lithium battery with a 10-year shelf life. It's available from Grove Enterprises (800-438-8155 or **www.grove-ent.com**) for $69.95. While you're asking, check out the upgraded TriField broadband signal detector if you need something more sophisticated.

A Techie Christmas

Here's a toy I might keep for myself! American Technology has come out with the Model 310 Desktop Calculator Clock Radio. Yup, all in one. Time is shown in hours, minutes, and seconds, plus year, month, and date, and a 200-year calendar up to 2099. A world time function shows the time in 24 major cities. The alarm functions as buzzer or radio.

The AM/FM radio (no expanded band) sports a rotating telescopic antenna, plug for an AC adapter and earphone jack.

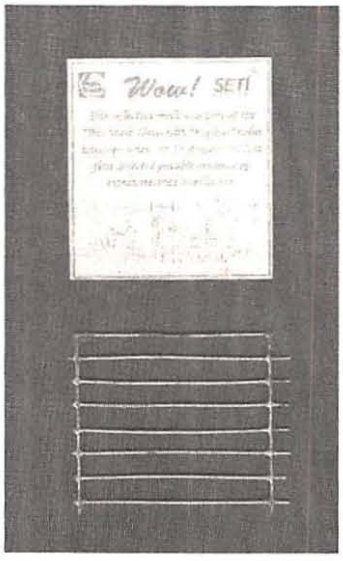
For battery power, it requires three AA alkaline batteries (not included). Other functions use two button cell batteries which are provided.

Last, but not least is a large-display calculator which folds out on a slant for easy operation. This nifty gift idea, which retails for about $51.99, is marketed by the American Technology Corporation (800-417-2346 or visit **www.atcsd.com**)

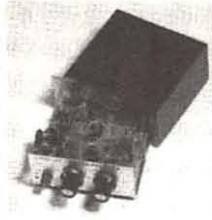
Remember the "Wow!"

You can take your place in the history of the search for extra-terrestrial intelligence (SETI) and get to keep a piece of it, too, when you make a minimum $100 tax-deductible contribution to The SETI League, Inc. One hundred pieces of the now-dismantled Big Ear Radio Telescope at Ohio State University have been mounted on a wooden plaque along with a depiction of the August 15, 1977, signal which made the OSU SETI famous. According to the promo, "These sections of antenna reflector were actually illuminated by the 'Wow!' signal, the most tantalizing (yet unconfirmed) evidence to date of extra-terrestrial intelligence."

Send your contribution to The SETI League, Inc., PO Box 555, Little Ferry, NJ 07643. (Visa or MasterCard accepted.) Proceeds are to be shared equally between The SETI League and OSU Radio Observatory. Allow four weeks for delivery. For more information call 800-TAU-SETI or visit **www.setileague.org/**



A Gift that Keeps Giving



When you give a hobbyist a kit to build, you give not only a nice piece of equipment at a bargain price, but hours of enjoyment and satisfaction as well. You can choose from thirty high-quality kits in Vectronics' new kit line, including shortwave converters, aircraft receivers, ham radio kits, and old fashioned crystal radio kits. And not one of these kits is priced over $100!

Each kit includes a PC board with screen printed components legend, quality components, and "owner's manual," which provides detailed assembly instructions and schematic diagram. The manual also gets you started once the unit is assembled. An optional custom cabinet is available for most kits.

To order or for your nearest dealer call 800-363-2922 or visit **www.vectronics.com**.

Voices in the Air

Nostalgia is in, and old timers as well as newcomers will enjoy *Voices In The Air...The Fascination of Radio*, Robert Bonebrake's personal look back as he relives the role ham radio has played in his life. Those of us who were there during the earlier days of vacuum tubes and home-brew rigs will identify with the author's fond reminiscences — late night listening to distant stations, struggling to learn the code and theory, getting the ham ticket, building a two-stage CW rig, dreaming about that first Hallicrafters receiver,

and more. A warm and gentle look back.

Voices In The Air is $12.95 plus shipping from RAD Publishing, PO Box 87785, Carol Stream, IL 60188-7785.

Your Best GPS Accessory

Hikers, hunters, real estate agents, surveyors ... all kinds of folks order the US Geological Service topographical maps, but these can cost $5 or more per map. North Carolina alone comprises 999 USGS maps! Now there's a great way to get all these topo maps and print out your own, customized copy.

Maptech has developed Terrain Navigator (formerly TopoScout); much more than just a map, this program can record trails, mark and measure distance and area, and view maps in four zoom levels, with path elevation and line of sight profiling. Add your personal markers for favorite camping or fishing spots; because the maps are geo-referenced, you can enter GPS coordinates. When you're ready, print it out to take with you!

A working demo is available on the web at **www.maptech.com/topo**. For information call Maptech at 800-627-7236. Terrain Navigator provides up to 300 maps per CD for up to $99.

Business News

- AOR, manufacturer of the AR-series wide-range receivers, has established AOR U.S.A., Inc, a sales and support center serving North America. Vice President in charge of AOR USA is Takashi "Taka" Nakayama, KW6I. The headquarters are located at 20655 S. Western Ave., Suite 112, Torrance, CA 90501; 310-787-8615. Watch their website at **www.aorusa.com** for news on several new products in the planning stages.
- Dr. Paul Shuch of The SETI League passed along the news that the quarterly magazine *SETIQuest*, edited by Carl Helmers, ceased publication one month following a similar announcement by *Satellite Times*. "These are indeed hard times for publishers!" he said, adding that the *SearchLites* bulletin for SETI League members will "do its best to fill the void" for up-to-date SETI information. (See address under "Wow" item)

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902 Press releases may be faxed to 828-837-2216 or e-mailed to mteditor@grove.net.

LETTERS TO THE EDITOR

NEWS AND VIEWS FROM OUR READERS — Rachel Baughn, Editor

Air Navigation in the UK

In the August "Letters," Albert Lozano mentioned the first hyberbolic navigation system — which inspired responses from two hobbyists:

Mike Powell wrote, "This system, invented during the war by Dr Dippy, was known as "Gee" (for Grid). It was still in use in 1956 when I did my National Service in the RAF (Signals) but it went out of use shortly afterwards."

Jacques d'Avignon, *MT*'s propagation columnist, adds: "The Gee System is a hyperbolic system operating on direct waves in the frequency bands between 25 and 85 mcs (MHz). It was developed as an aircraft navigation system and is said to provide coverage for any number of craft with an accuracy of from one fourth to one third of a mile up to distances of 250 to 300 miles depending on the altitude of the craft. Gee is a British development and at present quite complete coverage of the British Isles is in existence. The equipment has proven to be reliable and simple to operate and maintain."

Hm-m-m, is it being maintained as a backup, then?

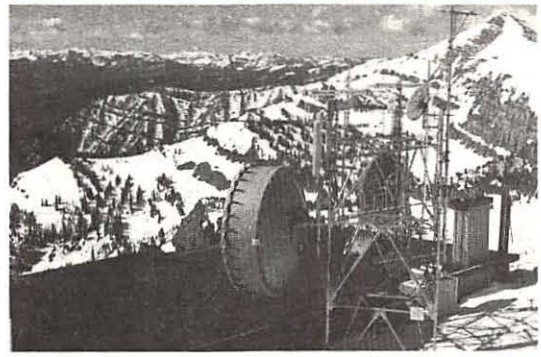
The Great NiCD Debate

Dan Hamilton of Cape Cod, Massachusetts, wrote regarding Werner Heim's article on NiCd cells in the March '98 *MT*, but he says he was "very disappointed to see it perpetuate the false myth about 'memory' in rechargeables and the attendant 'need' to discharge before recharging."

"I would invite *MT* readers to check out a superb web site, put together by a competent and articulate engineer, on this topic: **http://gnv.fdt.net/~redscho/**

"On that site you will find facts about precise behavior of NiCds under various conditions of charge and discharge. The bottom line is that there is almost no rational reason for discharging multi-cell packs ... and in fact some discharging schemes ... can permanently damage individual cells and therefore the whole pack."

For more discussion on rechargeable cells, be sure to check out Bill Cheek's October and November Experimenters Workshop columns. Also, as an aside, Dan also recommended Ben Saladino's Radio Manager for Windows program, "which is a very nicely done computer control interface for the BC895XLT."



Antennae at 10,450 feet: Greg Feis of Potomac, Maryland, took this picture of "quite a nice assortment of radio antennae" from the top of Rendezvous Mountain in the Wyoming Tetons.

For those for hard-to-find NiCd cell replacements, Bob Earl KD6UIH had this advice: "In the August issue of *MT's* 'Ask Bob' column Vern Batt asked about replacement nicads for a 1977 JVC portable TV. I get my batteries for anything from the NiCad Lady, Grace N6WPA; she is great.

"If Grace doesn't have the battery pack you need she can put new cells in the battery pack you have. She is reasonable in her prices and gives excellent service.

The NiCad Lady
17052 Alameda Drive Perris, CA 92570
Phone: (909) 789-0830
Fax: (909) 789-4895
E-Mail: *nicdlady@deltanet.com*

Think About It

In line with our guest editorial this month regarding frequency lists that get passed from hand to hand as gospel without being questioned or tested, Van R. H. Sternbergh of Cos Cob, Connecticut, has a similar beef with other "modern myths" that have no basis in fact. For example, the statement that the Great Wall of China can be seen from the Moon (Sept. issue, p.16). Here are some issues he'd like us to consider:

"1. The wall is in disrepair — only short sections have been 'restored' for the benefit of tourists.

"2. Even if the wall were continuous for its original 2,600 mile length, it follows the ridges of the foothills, and is almost never straight. There are few, if any, straight lines in nature, which is why airport runways and other large straight things (like interstate highways, bridges, etc.) can be so easily seen from airplanes.

"3. The wall is only a few yards wide — less than 30 feet wide at the top, and only about 60 feet wide at the base. This isn't much. The New Jersey Turnpike, or Interstate 95 is much wider.

"4. Think of the photos you have seen in *National Geographic* and elsewhere of the earth taken from space. Those taken from the moon merely show a big blue ball with lots of white stuff obscuring most of the features. Those taken from the space shuttle may show some vague outlines of continents, but even when you can make out Australia, you still can't see New Zealand. And believe me, New Zealand is MUCH bigger than the wall.

"I don't know how this canard got started, but it is widespread. When I was in China in March, my guide and the tourist literature continue to espouse this nonsense. It is simply not true — Ask your local high school physics teacher to work out the math, and you'll see what I mean. This could be an interesting class project. (If the 'great pyramids' of Egypt can't be seen from space, the wall hasn't a chance.)

"There *are* man-made constructions which can be seen from space (but not from the moon): irrigation circles in the Saudi Arabian desert. The pipe system slowly rotates around a central point, producing green circles thousands of yards across. Perfect circles like these do not appear in nature, which is one tip-off; the color contrast between the desert and the crops is the other."

Van also put it another way: can you see a human hair on the floor from the top of a flight of stairs?

We're appreciative of the reminder to stop and think. And you readers, here's a reminder to keep your brains and fingers involved in your hobby: Take nothing for granted — check it out for yourselves.

Maybe we should adopt a new slogan: *"MT — it's a real Mind Trip!"*

— Rachel Baughn, editor

STOCK EXCHANGE

Monitoring Times assumes no responsibility for misrepresented merchandise.

Ads for **Stock Exchange** must be received 45 days prior to publication date. All ads must be paid in advance to *Monitoring Times*.
Ad copy must be typed for legibility.

NON-COMMERCIAL SUBSCRIBER RATES: $.25 per word — *Subscribers only!* All merchandise must be personal and radio-related.

COMMERCIAL, NON-SUBSCRIBER, AND MULTIPLE SALES RATES: $1.00 per word. Commercial line ads printed in bold type.

1-3/4" SQUARE DISPLAY AD: $50 per issue if camera-ready copy or, $85 if copy to be typeset. Photo-reduction $5 additional charge. For more information on commercial ads, contact Beth Leinbach, 828-389-4007.

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CONSUMERTRONICS 200+ high-tech survival publications, Special Projects, Electronics, microwave, computers, Internet, phones, security, energy, financial, radionics, exotic weaponry, countermeasures. Catalog $3US, $7 foreign, PO Box 23097, Albuquerque, NM 87192, www.tsc-global.com/consumer.html

FREE 80-PAGE RADIO CATALOG. Call 1-800-522-8863, or visit our website: ccrane.com

HOBBY SHOP: customized filters, professional coax, RF connectors, Econn Electronics, 624 West Main Street, Suite 60, Norwich, CT 06360. 860-823-1230.

WANTED: NYE Viking Station Monitor Model RFM 003 RFM 005. Paying $600. Randy Ballard, N5WV 903-687-3002, e-mail: tmt@prysm.net

WANTED: Sangean ATS803A/DX440. Working condition. Will pay top $$ or trade an ICF-2010 for 'like new, in box' condition. Bill, 610-494-1559.

FOR SALE: Watkins-Johnson HF-1000 receiver. Latest software version, manual, original box. Call Dean, 518-834-7640.

WANTED: Panasonic RF-B45 in good condition. 912-744-4461.

TO SETTLE ESTATE. Purchased new Jan. 1997: R-9000 receiver, Universal M8000 decoder, JPS NIR12 interference reducer, MFJ antenna matcher. $5,600. Write Mrs. Mallinger, 129 Elatan Dr., Pittsburgh, PA 15243.

WHO CAN REPAIR BC2500XLT? Parts needed: logic board and RF boards. Call 303-936-2835 or write Richard Neuber, 2028 S. Hooker Cir., Denver, CO 80219.

FOR SALE: ICOM R7000 with "full" 800 MHz coverage and RC-12 remote. Excellent, $750 includes UPS shipping. 309-454-2249 or blomgren@ilstu.edu

DX Block" on WWCR sponsored by Grove Enterprises

WWCR and Grove Enterprises are proud to announce two well-established programs are being carried on WWCR as an informational service to the DX community.

The Voice of America's *Communications World* program, hosted on Dr. Kim Andrew Elliott, will be aired as a full one-half-hour radio program. Following Dr. Elliott's program will be the half-hour *World of Radio* with Glenn Hauser.

Exclusive sponsorship of this DX block is being provided by Grove Enterprises, publishers of *Monitoring Times*. See web sites at: **www.grove-ent.com** and **www.wwcr.com**

The DX block can be heard on WWCR-Shortwave Radio, on 5070 kHz - Saturday at 2200 UTC. The block is repeated on 3210 kHz - Monday at 0500 UTC, on a space available basis.

INDEX OF ADVERTISERS

CLOSING COMMENTS

By Bob Grove, Publisher

The Frequency List and the Grain of Salt

A Guest Editorial by MT Assistant Editor Larry Van Horn

If I hear one more commercial or email message telling me that the Internet is the answer to all of the world's problems, or the greatest storehouse of knowledge in the world, I'm going to yank my modem plug out of the wall.

Now don't get me wrong. I like the Internet as a whole, I really do. I greatly enjoy several email news groups such as milcom, fedcom, and amfmtvdx. But when it comes to accurate frequency information, I take it all with a huge grain of salt. Consider the following recent example. During the latter part of August, Hurricane Bonnie threatened the U.S. coastline. On just about every radio-related news group the call went out for hurricane-associated frequencies that could be heard on shortwave radio.

Within minutes someone would post his comprehensive list of frequencies into the waiting hands of the anxious hobbyist who made the original request (and, of course, everyone else in that news group). Over a 24 hour period I saw dozens of hurricane frequency lists come out of every nook and cranny of the net. Dozens more gave addresses to Internet websites where even more of these wonderful lists could be found.

So I did a little walkabout on the worldwide web in search of this great storehouse of hurricane frequency information. What I found was a huge disappointment. Not one single list — whether posted to the news groups or found on the web — had accurate and up-to-date information. Most of the lists were just plain wrong all the way through.

When I asked some of these list owners if any of them had actually turned on a radio to verify their patented frequency list, the answer was always the same – no! No one seems to take the time to update information before posting it — well-meaning respondents just pass it along indiscriminately as fact.

This doesn't just apply to the aforementioned hurricane related frequencies; some of the recent lists of air show frequencies border on the ridiculous. And let's not even discuss the folks in Montana passing along scanner frequency lists for monitors in New York City!

Some lists have circulated on the net for so long now they have become gospel, and Heaven help the person that attacks their accuracy! You will hear folks say, "I got this list from inside sources," or (the one I love to hear), "it came from the pages of *Monitoring Times* or *PopComm*" — with no attribution to either source on the posted list, of course.

Someone recently sent me a supposedly up-to-date utility military frequency list. I thought it looked familiar, so I went back into my *Utility World* archives and sure enough, it was one I ran in 1990 in *MT*, typing mistakes and all. It was forwarded to me by this person who said he had personally developed the list over many years of monitoring. Having let his *MT* subscription expire in 1991, this person was unaware of all the major changes that had occurred to this particular radio network since his subscription ran out — or of the fact that he was feeding a frequency list back to its original author!

The integrity that originally built these frequency lists through actual radio monitoring has been thrown out the window by those who want to be the first to post something. Also the lack of proper attribution to the source is not only plagiarism, but ignores the basic rules of proper research techniques. Of course, in the end, someone may actually hear something on frequency from one of these lists, but does that validate the entire list? Clearly not.

Something for Nothing?

There is a whole generation of new radio listeners out there with the mindset that they don't need to buy a book or magazine for their radio information. They are going to save money and get it from the 'net. The best example of this was the gent who was taking a trip from the West Coast to the East Coast. He posted his complete route cross country in an email message and wanted scanner buffs to provide him with every frequency he would hear on his trip! This fellow didn't need help from the list, he needed to quit being so darn cheap and buy the *Monitor America* book by Scanner Master!

To hobbyists with this mindset, I say you are getting exactly what you deserve: you pay nothing and, chances are, that's about what the information is worth. As you get your free Internet frequency list, ask yourself, "Who is minding this store and making sure that what you got was right?" If we in the magazine business perform badly, the consumer votes with his pocketbook. If a website does badly, the worst that can happen is they get fewer hits and the recipients get bad information.

The Moral to This Story

So what is the solution? First, never post to the net a list that you haven't personally verified or that does not acknowledge the original source of information. At least with some sort of attribution, consumers can judge the accuracy of the new postings based upon the past performance of of that compiler.

Second, rather than sending out a list of old discrete frequencies that are no longer valid, it would be more useful if experienced monitors would recommend to newcomers the frequency ranges in which to tune around for a particular listening target. Listeners can then report back what they actually heard. This approach builds a viable list, helps newcomers gain monitoring experience, and can be downright exciting! On the other hand, if folks can't find signals on the list they were given, they may get discouraged and give up on the hobby altogether.

So the next time you hear that helpless cry of, "I need frequencies for ..." please pass along those frequencies with a grain of salt ... and with appropriate credit. And you on the receiving end, verify the list you receive before you pass it on. It might be a pig you got in that poke, or it might be a deliberate ringer to thwart plagiarism — like the FleetSatCom Delta bandplan frequency list!

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